



**MOLDOVA STATE UNIVERSITY,
SCIENTIFIC ASSOCIATION OF GENETICISTS AND BREEDERS
OF THE REPUBLIC OF MOLDOVA,
NATIONAL RESEARCH AND DEVELOPMENT INSTITUTE FOR
BIOLOGICAL SCIENCES, BUCHAREST, ROMANIA**

The National Conference with international participation

NATURAL SCIENCES IN THE DIALOGUE OF GENERATIONS

8th edition

ABSTRACT BOOK



**September 18-19, 2025
Chisinau, Republic of Moldova**



MOLDOVA STATE UNIVERSITY
Institute of Genetics, Physiology and Plant Protection
Center of Functional Genetics
Doctoral School in Natural Sciences
Faculty of Biology and Geosciences
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Session A

BIODIVERSITY, CLIMATE CHANGE AND BIOSECURITY

ECOPHYSIOLOGICAL ADAPTATIONS OF HALOPHYLOUS GRASSLAND PLANTS (NATURA 2000 SITES)

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The purpose of this research is to investigate the adaptations of representative plants from salt grasslands, *Natura 2000* sites, through specific indicators that assess the resilience of the analyzed species and their interrelation. The analyzed eco-physiological parameters were: gas-exchanges at the leaf level (instantaneous photosynthesis rate, transpiration, stomatal conductance, internal CO₂ concentration), assimilatory pigments (chlorophyll a, chlorophyll b, and total carotenoid pigments), carbohydrate fractions (monosaccharides, disaccharides, polysaccharides), water and dry matter content from the leaves. The investigated species were representative herbaceous from the Pannonic and Pontic-Sarmatic salted grassland and marshes (1530*) habitat type from the two studied sites, Saline Grassland of Lower Jijia-Prut (ROSCI0222) and Saline Grassland from Valea Ilenei (ROSCI0221), Iași County, situated in the northeastern region of Romania.

The analyzed species from habitat of 1530* of Pannonic and Pontic-Sarmatic salted grassland and marshes have shown a good adaptation at the species level and even at the community to the pedo-climatic conditions of the summer season, achieving high values of photosynthetic capacity (photosynthesis rate and values of photosynthetic pigments), of carbohydrate accumulation, especially polysaccharides (nutritional and energy reserves of the plant), water content, predominantly in native species from the *Gramineae* family. Among these species, the communities with *Lolium perenne* from the Vlădeni plot (Salt Grassland of Lower Jijia-Prut) which showed a high abundance - approx. 80% stand out as being resilient to the threat posed by actual factors (anthropic: close proximity to agricultural crops, grazing) and future (extreme temperatures and prolonged drought), as well as those from the Valea Ilenei plot such as *Carex vulpina* and *Lolium perenne* due to limiting station conditions (phreatic level at surface soil, salt water stagnant).

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Keywords: photosynthesis, assimilatory pigments, Saline Grassland of Lower Jijia-Prut (ROSCI0222), Grassland from Valea Ilenei (ROSCI0221).

WILDFIRES - DRIVER OF FOREST LOSS AND BIODIVERSITY INTEGRITY

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Wildfires are an increasingly significant driver of global forest loss, with profound consequences for biodiversity and ecosystem integrity. Over the past two decades, satellite observations have recorded a marked rise in fire-induced deforestation, which is now responsible for over 25% of global tree cover loss annually. Once confined to fire-adapted biomes, severe wildfires are increasingly affecting tropical rainforests, boreal forests, and Mediterranean woodlands. This trend is primarily driven by climate change (rising temperatures, prolonged droughts), land-use change (logging, fragmentation, agricultural expansion), and anthropogenic ignitions, especially in vulnerable regions. Major ecological hotspots illustrate this global shift: the Amazon basin has experienced over 190, 190,000 km² of burned rainforest since 2001, with critical habitat losses for over 95% of known species; Siberia's taiga forests burned at record levels in 2020; and the 2019–2020 Australian bushfires affected more than 10 million hectares, severely impacting endemic fauna. These events underscore a key pattern: fire is becoming both more frequent and more destructive, compromising forest structure, species composition, and spatial connectivity. The mechanisms linking wildfires to biodiversity loss are multifaceted. High-intensity fires can destroy old-growth canopies, reduce structural complexity, and delay regeneration. Recurrent fires lead to biotic homogenization, replacing specialised native species with fire-tolerant generalists. Fragmentation increases the isolation of populations, limiting species dispersal and survival, particularly for non-mobile or endemic species. Moreover, fire-induced stress compounds other threats, accelerating local extinctions and ecological degradation. In conclusion, fire-driven forest changes are reshaping global biodiversity patterns. Effective responses must integrate fire prevention, improved land-use regulation, climate mitigation, and the protection of intact forest landscapes. Only through coordinated, science-based policies can the cascading ecological effects of escalating wildfires be contained, ensuring the resilience of forest ecosystems in the face of a rapidly changing climate.

Keywords: *wildfires, forest fragmentation, forest landscapes, land-use changes*

SUNFLOWER CROP IN ROMANIA

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In Romania, sunflower is the most important oil crop and occupied third place in agriculture plant after wheat and maize. In context of climate change, seed yield of sunflower decrease in every year and in year 2024 was registered the low seed yield from last 15 years with an average of 993 kg/ha. Agricultural year 2024 was the hottest year from last 60 years from Romania with an average annual temperature on country of 11.62°C. At level of European Union, sunflower was cultivated in year 2024 on 4.804.87 thousand hectares and in Romania on 1.262.22 thousand hectares who occupied first place in terms of area cultivated, followed by Bulgaria with 929.08 thousand hectares. In Romania, in sunflower culture the most restrictive for sunflower seed yield, from abiotic factors, drought and heat and from biotic factors, pathogens *Plasmopara halstedii*, *Sclerotinia sclerotiorum*, *Phoma macdonaldii* and *Diaporthe helianthi*.

Keywords: sunflower, drought, climate change

ANIMAL WELFARE: AN DOMAIN OF CONCERN

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In recent decades, animal production has seen a significant intensification in response to the growing global demand for food. This expansion has led to the growth of large numbers of farm animals, often kept in confined space conditions, with limited attention paid to their welfare.

To date, the concept of animal welfare is not clearly defined, as it is influenced by diverse ethical and moral views. Although there is no universally accepted definition, animal welfare generally refers to the state in which animals are able to cope with the living conditions in which they find themselves. This includes both the physical aspects (such as avoiding pain and suffering), psychological aspects (protecting the mental health of animals) and the possibilities of expressing natural behavior, being a complex concept that takes into account the available resources and the environment in which the animals live.

The welfare of animals depends on the conditions in which they live and their interactions with humans and the environment. If animals are kept in favourable conditions and without suffering, their well-being is satisfactory, but lack of resources or inadequate treatment can lead to deterioration of welfare and suffering.

It is essential to emphasize that, in addition to physical suffering, farm animals can also endure psychological trauma. Being sentient beings, they are capable of feeling emotions and psychological pain. Negative or stressful experiences can profoundly affect their mental well-being, and this should not be underestimated when assessing their living conditions.

The importance of the psychological well-being of animals cannot be underestimated, as it directly influences their physiological status and quality of life. Research in the field of animal welfare also highlights the need for a balance between the physiological and emotional needs of animals, in order to provide them with an environment in which they feel safe and healthy in all respects.

In conclusion, animal welfare refers not only to the conditions in which they live, but also to the way they interact with humans and their environment. Physical or psychological suffering must be minimized to guarantee a high standard of animal welfare. In this regard, continuous research and public education play a key role in improving the lives of farm animals.

Keywords: *animal welfare, area of worry.*

CORRELATIONS BETWEEN MAJOR ANTIOXIDANT SYSTEMS OF SEMEN

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Ejaculated reproductive cells are aerobic and must fight toxic levels of reactive oxygen species (ROS) generated by their own metabolism and other sources. Mammalian sperm are extremely sensitive to oxidative stress, but they have enzymatic and non-enzymatic antioxidant systems. In seminal plasma, these antioxidant systems act as absorbents of oxidants and fight oxidative damage at various structural levels of lipids and proteins. Enzymatic and non-enzymatic factors interact in extracellular and intracellular spaces, providing optimal protection against increased ROS. Under these conditions, ROS plays a dual role, physiologically, to complete the maturation of sperm, but in excess they are harmful to cellular structures, functions and survival. Extracellular oxidants are responsible for lipid peroxidation of sperm membrane, affecting sperm motility and morphology, and intracellular ROS alters physiological pathways through oxidation of substrates. Therefore, antioxidants play an important role in balancing the concentration of oxidants in seminal fluid and in the physiology of semen. Reproductive cells use several strategies to prevent ROS-mediated cell damage. First, the mitochondria, which are the main source of cellular ROS, are located in the middle and are spatially removed from the nucleus, which limits access to the DNA of the sperm ROS. On the other hand, enzyme and non-enzyme systems are involved in intercepting, delocalizing, or deactivating oxidants to limit their toxic activity. After ROS-induced sperm damage, the results are determined by the severity of the lesion and the activity of apoptosis to remove damaged sperm. The mechanisms of repair of damage associated with oxidative stress are very limited to sperm, as they are transcriptionally and translationally silent cells, in particular, after the completion of spermatogenesis, the mechanisms of repair of DNA damage are not available and this increases the susceptibility of mature sperm to damage mediated by oxidative stress. In addition, mature sperm have only a small amount of cytoplasm and therefore depend on seminal plasma for antioxidant protection. Thus, low levels of antioxidants and increased of ROS in seminal plasma lead to oxidative stress, affect sperm structure and function, leading to reproductive disorders and male infertility.

Keywords: *semen, oxidative stress, antioxidant, reproduction.*

EARLY CLARY SAGE (*SALVIA SCLAREA* L.) VARIETY AMBRIELA

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Salvia sclarea L. (Clary Sage) is a medicinal and aromatic species in the family Lamiaceae. The special interest for this genus, the multiple researches on its chemical composition are due to the fact that in the essential oil of clary sage have been identified 160 polyphenolic compounds, some of which are unique because they are contained only in the species of the genus *Salvia* L.

The essential oil was isolated by hydro-distillation in Ginsberg devices. The evaluation of quantitative characters, the phenology, the determination of resistance to wintering and drought, the productivity, the statistical analysis was performed according to the testing methods of plant varieties to the State Commission on Plant Variety Testing of the Republic of Moldova. The evaluation of quantitative characters, the phenology, the determination of resistance to wintering and drought, the productivity, the statistical analysis was performed according to the testing methods of plant varieties.

In Moldova, hybrid varieties of *Salvia sclarea* L. are created and approved, which flower and produce raw material and essential oil from the first year of vegetation. The variety *Ambriela* is the complex hybrid with constant heterosis. Very good resistance to wintering; very high resistance to drought; Resistant to foliar diseases and root system diseases. Essential oil content: First year of vegetation: 0.353% (standard humidity, 70%); 1.175% (dry. matter); Second year of vegetation: 0.335% (st. h.) 1.185% dry matter. The quality of essential oil is excellent due to the high content of linalyl acetate and sclareol. Major components in essential oil: linalyl acetate 61.06%, linalool, 8.59%, sclareol, 5.25%. Production capacity: flowering capacity in the first year of vegetation. The average inflorescence production in two years exploitation of plantation is 17.6 t/ha. Essential oil content -1.175 - 1.185 % (dry matter).

The production of essential oil in two years constitutes 55.6 kg/ha. Yield – 3.4 kg essential oil / ton of inflorescences.

Acknowledgments: This study was supported by the research subprogram 011102 Increasing and conservation genetic diversity, agricultural crop breeding in the context of climate change, financed, funded by the Ministry of Education and Research.

Keywords: *Salvia sclarea* L., quantitative characters, essential oil, production.

RESEARCH ON NEW REMEDIES WITH FUNGICIDAL ACTION IN IMPACT ON AUTUMN BARLEY DISEASES, CENTRAL AREA

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Of particular importance in the cultivation of autumn barley are the key diseases, which appear consecutively throughout the growing season of plants caused by environmental conditions. Barley plants are subject to the impact of a complex of pathogenic agents, which include over ten species of diverse etiological and pathological nature, as key objects of economic importance, that annually cause serious damage, such as: *Erysiphe graminis* f. sp. *hordei*, *Puccinia anomala*, *Helminthosporium teres*, *Pyrenophora graminea*, *Pyrenophora teres* și *Rhynchosporium secalis* etc. Phytosanitary surveys in the areas planted with autumn barley were carried out from the fall of 2022 to 2024, where we found that in the investigated experimental sector of the "Răzagro-Prim" P.A., district Ialoveni. For cereals planted in autumn, including barley, the treatments, during the growing season, are applied according to prognoses and warnings, but more frequently they are used according to the phenological criteria and the severity of attack by pathogens and symptoms of the detected diseases. The conditions were favourable for the growth and development of autumn barley, but favourable for the primary infection. The fungicidal remedies *Amistar Prime*, SE – 0,75 l/ha, *Amistar prime*, SE- 1.0 l/ha, *Ampir*, SC – 0,4 l/ha, *Ampir* 0,6 l/ha, *Ampir* 0.8 l/ha, *Lot*, SC – 0,7 l/ha fungicides have been tested against the diseases detected in autumn barley plantations. The efficiency of these new remedies with anti-fungal action was proved depending on the doses applied and the severity of the disease, as compared with the standard control. The new fungicides are recommended as efficient chemical products in the integrated protection system of autumn barley. The frequency and intensity of the attack of pathogens, ranged between 15 and 50%, depending on environmental factors, and the biological efficiency of the new remedies, tested on experimental plots as fungicides was 88-94%, at the level of the standard variant, comparing the variants and doses applied a standard fungicide.

Acknowledgments: This study was supported by the research project 010701 and 010102 funded by MSU, Institute of Zoology and "Al. Ciubotaru" NBGI.

Keywords: autumn barley; fungicides; disease, experimental sectors, biological control.

EVALUATION OF SUNFLOWER HYBRIDS' GENETIC POTENTIAL UNDER CLIMATE CHANGE IN MOLDOVA

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The sunflower germplasm collections possess a hidden reserve of new genes and their combinations, including important traits for breeding amidst global climate change. Studying the sunflower gene pool potential concerning key biological, genetic, and economic traits will enable the expansion of the crop's genetic base and enhance genetic diversity, facilitating the successful implementation of breeding programs across various climatic zones.

In the present study, the evaluation of some commercial sunflower hybrids with different origins in the conditions of the northern and southern regions of the Republic of Moldova was conducted during the years 2020-2022 to select the hybrids having valuable traits as additional sources for the intensification of sunflower production in the country. In this context, 6 hybrids created by the different European and local agricultural companies and a set of 3 controls that were characterized by 3 maturity groups (early, semi-early, semi-late) were included in the research. The biological material was assessed according to some phenological and physiological indicators (leaf area index, leaf surface, amount of chlorophyll a and b, amount of carotenoids), being carried out biometric measurements, counts and visual assessments regarding the determination of phenotypic diversity (plant height, number of leaves) and also productivity (average yield, oil content). To perform the genetic evaluation, 11 arbitrary RAPD primers (OPB12, OPC05, OPC07, OPF08, OPD07, OPA11, OPG6, OPG10, OPE17, OPI16, OPH15).

It was established that the tested hybrids exhibit high variability based on their morphological traits and productivity, which largely depend on genotype, their origin, and the zonal and annual climatic conditions. Thus, summing up the results from the analysis of quantitative traits for six sunflower hybrids of different backgrounds over two years, it should be noted that two hybrids of French origin (60 and 34) demonstrated the most promising traits according to the majority of traits, while three other hybrids (64 and 30 of French origin, and 11 of German origin) showed potential in some traits, reflecting the sustainable management of agricultural ecosystems in the agroclimatic conditions of the Republic of Moldova.

The variation of genetic polymorphism in the range of 22.22 to 100% at 6 hybrids with 11 primers proves that the researched hybrids are quite heterogeneous. The specific fragments detected through RAPD primers are of particular interest as hybrid- or species-specific markers, indicating the presence of wider variability in hybrid populations and may be used as molecular markers in genotyping or certification of sunflower hybrids. Moreover, according to the statistical analysis on the efficiency and informativeness of the RAPD primers using differentiation

coefficients (PIC, h_j , R_p , MI, and EMR), 4 the four most effective primers were found: OPG10, OPG6, OPA11, and OPB12.

The genetic diversity analysis for the 6 sunflower hybrids found the high values of observed number of alleles ($N_a=1.57$), effective number of alleles ($N_e=1.39$), Nei's gene diversity ($H=0.23$), Shannon's information index ($I=0.33$), total gene diversity ($H_t=0.23$), percentage of polymorphic loci ($PPL=57\%$), revealing a high variability of RAPD fragment sequences in the studied hybrids. Thus, generalizing the data obtained by analyzing the parameters of genetic diversity, it may be noted that the local 7 and German 11 hybrids are the most heterogeneous and unstable towards the biotic factors in the entire sample studied.

Therefore, in all analysed cases of genetic distance, it was revealed that the investigated hybrids represent relatively heterogeneous genetic material. The results obtained suggest a certain degree of genetic similarity and divergence between hybrids that is unrelated to geographical origin.

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Keywords: *sunflower, hybrids, genetic diversity, quantitative traits, RAPD analysis, marker.*

EFFECT OF BACTERIAL EXOMETABOLITES AGAINST FUSARIOSIS – PATHOGENS OF EGGPLANT CROP

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The eggplant crop (*Solanum melongena*) suffers from fusariosis provoked by *Fusarium* strains.

The aim of the research was to find ways to inhibit the growth of species of the genus *Fusarium* (*F. oxysporum* CNMN-FF-06, *F. solani* CNMN-FF-07) using bacterial exometabolites (*Bacillus velezensis* CNMN-BB-16; *Micrococcus yunnanensis* CNMN-BM-19; *Actinomadura* sp. 36), which were used to treat the seeds of the *Solanum melongena* cultivar Classic F1.

The studies were conducted by using the test tube water agar seedling symptom test method. The growth and development of plants in test tubes lasted 14 days at $26.5 \pm 0.1^\circ\text{C}$. Were determined percentage ratio of suppression by McKinney formula, as well as the total length of the eggplant sprout in comparison with the control.

After conducting experiments, when using *B. velezensis* exometabolites (EM), in the 1.0% supernatant solution variant, complete suppression of *F. oxysporum* growth was noted, however, phytostimulation was not noted, the plant length was almost equal to the control. But, in relation to *F. solani*, in addition to suppression of phytopathogenic growth, phytostimulation in the 2.0% supernatant variant was by 34.0% higher than the control. *M. yunnanensis* EM suppress the growth and development of *Fusarium* strains, however, phytostimulation was noted when using 3.0% supernatant by 31.1% (*F. oxysporum*), and 1.0% suspension by 43.3% (*F. solani*). In experiments with *Actinomadura* sp. EM, suppression of the growth of *Fusarium* fungi is also noted, but significant phytostimulation is noted in the 3.0% supernatant variant – by 41.9% (*F. solani*).

The obtained results show the potential of using bacterial preparations to protect plants against fusariosis.

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Keywords: Fusariosis; *Solanum melongena*; *Bacillus velezensis*; *Micrococcus yunnanensis*; *Actinomadura*.

STUDY OF THE BIOMORPHOLOGICAL FEATURES OF THE SPECIES *ARTEMISIA STELLERIANA* BESSER UNDER THE CONDITIONS OF THE REPUBLIC OF MOLDOVA

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Our research included the identification of biomorphological peculiarities, under *ex-situ* conditions, of the aromatic species *A. stelleriana*, introduced to the Botanical Garden through the international seed exchange, Index Seminum, from Germany, in 2021. The research was also focused on the variations of the essential oil content depending on the plant development stage. The species *A. stelleriana* is of particular importance, being used for medicinal, aromatic and ornamental purposes.

Artemisia stelleriana Besser, commonly known as “beach wormwood”, is an herbaceous, perennial species, growing about 30-40 cm tall, easily recognizable due to its attractive leaves, covered on both surfaces with thick trichomes, giving a silvery or whitish appearance. It is widely cultivated as an ornamental plant in gardens, parks. It reproduces vegetatively by division, as well as generatively. It prefers dry or moist soil and can tolerate drought.

Under the local pedoclimatic conditions, *Artemisia stelleriana* is characterized by the development of 8-12 annual shoots in perennial plants, which start growing in early April. The stems are erect, robust, densely covered with hairs. The leaves are fragrant, silvery green, deeply lobed and densely covered with hairs on both sides. The number of leaves on the central axis was found to be 28-34, with a length of 8.0-8.5 cm and a width of 3.0-3.5 cm. The budding stage begins at the end of June. In the middle of August, the full flowering stage occurs and lasts about 40-45 days. The flowers are panicles, composed of yellow cup-shaped flowers, the corolla is empty, tubular-conical and is visited by pollinating insects. Seed ripening begins at the end of September. The fruits are small achenes. The plants are resistant to low temperatures. In the reference year, the essential oil content was determined depending on the development stage, with a maximum of 0.055-0.057% green mass and 0.155-0.160% dry matter in the full flowering stage. Recent studies have shown that the essential oil is a rich source of linoleic acid and eucalyptol, a promising compound that confirms its anti-inflammatory and antioxidant action.

The investigations carried out have demonstrated that the *A. stelleriana* species has successfully adapted to the pedoclimatic conditions of the Republic of Moldova, which allow the plants to fully complete the ontogenetic cycle. *A. stelleriana* contains valuable essential oil and is also a promising species for landscaping.

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Keywords: *plant, conservation, content, essential oil, study.*

WORKING ON THE CONSERVATION OF PLANT GENETIC RESOURCES OF UKRAINE

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Over the past century, as a result of ecologically unsound management in Ukraine, significant changes have been observed in the natural vegetation cover structure. "Genetic erosion" threatens plant diversity and FAO experts think that it has been caused by replacement of landraces with modern commercial varieties. This trend ensures rapid high profits but increases the genetic uniformity of crops. The world scientific community has determined that the best strategy for preventing "genetic erosion" is *ex situ* preservation of plant gene pool accessions, including wild flora and landraces, in GenBanks, *on-farm* conservation by farmers and in *in situ* agroecosystems, which are protected by the state due to their environmental value. Such measures ensure the preservation, research, reproduction, use and, if necessary, reintroduction of wild plants to natural habitats. The solution to the gene pool loss problem is the Plant GenBank of Ukraine. Ustymivka Experimental Station of Plant Production of the Yuriev Plant Production Institute of the National Academy of Agrarian Sciences of Ukraine is one of the 28 institutions that are part of the Plant GeneBank of Ukraine. The Station works at the introduction, formation, preservation, comprehensive investigation and use of the plant gene pool in breeding, scientific and educational programs. As of 2024, the Station has formed a gene pool comprising 32,824 accessions of 154 crops; of them, 11,333 accessions are Ukrainian. By biological status, the gene pool is represented as follows: 10,965 breeding varieties, 12,160 landraces and local forms, 5,901 breeding lines, 170 genetic lines, 134 synthetic populations, 30 hybrids of vegetatively propagated crops, 46 clones of vegetatively propagated crops, 3,171 wild species and forms, and 247 specimens with undetermined status. According to the FAO, the Ukrainian collections are of not only national but also global importance. The plant gene pool of Ukraine is a significant and valuable part of the world's gene pool and our state bears the responsibility for its preservation to the world community.

Keywords: *plant GenBank, plant gene pool, preservation, ex situ, in situ, on-farm.*

TEMPERATURE AND PRECIPITATION TRENDS IN THE IALPUG RIVER BASIN REGION

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The changes taking place at the global climate level affect all communities, regardless of their level of development. The extent of the impact largely depends on territorial characteristics (physical geographical location).

To ensure the most effective adaptation possible at the global level, it is necessary to study in detail the evolution of climate parameters at the local level, based on the particularities of the study area.

This study focuses on the Ialpug river basin region, using the Comrat meteorological station as a reference point. The climate analysis was based on two key variables: air temperature and atmospheric precipitation.

The methodological framework used to effectively identify trends in the analysed data, the Mann-Kendall test, provides a rigorous analysis of temperature and precipitation. The results provide us with a comprehensive picture for understanding the impact of climate change in the Ialpug basin region. The results showed a seasonal distribution specific to a moderate continental climate, with the highest atmospheric precipitation values recorded in June – 70 mm (1993–2024 period). The lowest values were recorded in the winter months. The general trends of decreasing precipitation by 0.6 mm per year, presented both by the linear trend and by the Mann-Kendall test, suggest a greater influence of local physical and geographical factors (quite large variation from year to year) than the linear trend over time.

The average annual temperature recorded at the weather station under study shows fairly significant annual fluctuations and a steady increase over the last 60 years, by about 0.032C/year. At the seasonal level, there has been an increase in temperatures during the summer season, especially since 1989. The winter season has also seen higher temperatures over the last 20 years.

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Keywords: *climate variables, weather station Comrat, Ialpug River Basin*

THE IMPACT OF FERTILIZATION AND CHEMICAL AMELIORATION ON MICROORGANISM ABUNDANCE AND CO₂ EMISSION IN SOD- PODZOLIC SOIL

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Purpose of the research was to study the composition of microbial biomass and the characteristics of carbon dioxide emissions in sod-podzolic soil under different fertilizer doses, crop by-products, and chemical amelioration practices. The research aims to assess how these factors influence microbial communities, nutrient cycling, and CO₂ emissions during soybean cultivation. The findings will provide insights into optimizing soil management practices for improving soil health and mitigating environmental impacts.

Research methods: The research was based on a stationary field experiment (50°70'81" N, 26°54'55" E). In soil samples from the soybean agrocenosis (milky ripeness phase of the grain), the number of microorganisms from the main ecological-trophic and taxonomic groups was determined using standard microbiological methods: plating on solid agar media, calculating mineralization and oligotrophy coefficients, and assessing soil biological activity (microbial biomass content and carbon dioxide emissions). As a result, the effect of fertilizer doses, ameliorants, and crop by-products returned to the soil (total background) on the composition of microbocenoses and the intensity of carbon dioxide emissions, aimed at stabilizing biological cycle flows in sod-podzolic soil, was established.

It was established that the lowest number of microorganisms from the main ecological-trophic and taxonomic groups was observed in samples without fertilizers and chemical amelioration (control), except for the micromycetes. In the soybean agrocenosis, the number of micromycetes in the treatment was the highest (4.6 thousand CFU/g of soil) among the studied soil samples. However, the carbon emission level in the control was at the same level as in the variant with the recommended fertilizer dose in combination with lime flour – CaCO₃ (1.0 Hh – dose calculated by the hydrolytic acidity), but higher compared to other fertilization variants with dolomitic flour – CaMg(CO₃)₂. For the control variant (no fertilizers and amelioration), the soil respiration data correlate with the number of micromycetes and microbial biomass content. The low biomass level is explained by the micromycete content, while other ecological-trophic microbial groups were at low levels.

In soil samples with the calculated fertilizer dose (the normative method based on NPK removal by main crop production) against the background of CaMg(CO₃)₂ (1.0 Hh), a significant increase in the number of streptomycetes and oligotrophs was

observed, indicating the later stages of successional processes in the microbiocenosis. Moreover, in this variant, the oligotrophy coefficient exceeded 1, which suggests that the microbiocenosis exists under conditions of low nutrient availability. The mineralization coefficient of 0.7 indicates a tendency toward the use of humus substances to support the existence of the microbiocenosis. The highest mineralization coefficient values of 0.85 and 0.79 were observed in the variants without fertilizers and chemical amelioration (control) and with $\text{CaMg}(\text{CO}_3)_2$ (1.0 Hh), respectively. In these variants, microorganisms experience a deficit of exogenous substances and are able to utilize an alternative survival strategy, namely, the decomposition of soil organic matter.

Based on the measurements of microorganism abundance from ecological-trophic and taxonomic groups, biomass, and carbon dioxide emissions in soil samples from the soybean agrocenosis, it was found that the most "balanced" level of physiological-metabolic processes in the microbiocenosis occurred with the recommended fertilizer dose, in combination with $\text{CaMg}(\text{CO}_3)_2$ (1.5 Hh) and CaCO_3 (1.0 Hh). The stability of the microbiocenosis in these variants is also indicated by the mineralization (not exceeding 0.5) and oligotrophy coefficients (with values around 0.5).

The lowest carbon dioxide emission level (10.1 mg CO_2 /g of soil per day) among the studied samples was observed with the application of nitrogen fertilizers combined with by-products, on a background of $\text{CaMg}(\text{CO}_3)_2$ (1.0 Hh). These results correlate with the microbial biomass content, which was 74 $\mu\text{g C/g}$ of soil.

Such low biological activity indicators are explained by the more active development of the bacterial component of the microbiocenosis compared to the mycelial component.

Keywords: soybeans, fertilizer doses, chemical amelioration, crop by-products, microorganisms, CO_2 emission.

ANALYSIS OF *SCELIONIDAE* SPECIES (INSECTA: HYMENOPTERA) IN THE COLLECTION OF THE INSTITUTE OF ZOOLOGY, USM

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The *Scelionidae* family, part of the order *Hymenoptera*, consists of microscopic parasitic wasps distributed worldwide. They parasitize the eggs of insects, mainly from *Hemiptera*, and contribute to the natural control of agricultural and forestry pests. Scelionids are tiny (1–5 mm), with slender bodies, sensitive antennae, and specialized ovipositors for egg deposition. Their morphology reflects adaptations for parasitism and high mobility.

This work includes the results of the inventory of the Scelionidae collection from the Entomology Museum of the Institute of Zoology, comprising a total of 277 specimens representing 38 distinct species, grouped into 9 genera: *Calliscelio*, *Telenomus*, *Trissolcus*, *Scelio*, *Sparasion*, *Apegus*, *Porabarycontus*, *Anteris*, and *Plesiobaesus*.

The faunistic material was collected in 1987, 1991, 1992, 1997, and between 2003–2011, during the months from May to October.

The analysis of the collection shows that the vast majority of individuals — 151 specimens — were collected during June and July.

The genus *Telenomus* is numerically dominant, represented by 67 species with 191 specimens, followed by the genera *Trissolcus* (29 species with 31 specimens) and *Scelio* (4 species with 26 specimens), which show lower but steady diversity in the collected material.

The species with the highest frequency is *Telenomus chloropus* (Thomson, 1860), with 66 specimens, followed by *Scelio rugosulus* (Latreille, 1808) with 22 specimens and *Telenomus hofmanni* (Mayer, 1879) with 13 specimens.

In contrast, species such as *Calliscelio ruficollis* (Kieffer, 1908) and *Sparasion anescens* (Förster, 1856) are represented by only a single specimen, a situation that may be correlated with species-specific habitat preferences and periods of biological activity.

The faunistic material was collected across the entire territory of the Republic of Moldova from 39 localities, with most specimens collected in Brînzani, Cuhneşti, and Codrîi Reserve, known for their complex forest habitats and high biodiversity.

The data can serve as a basis for future faunistic studies on this important group of hymenopterans, ecological studies, or conservation projects.

Acknowledgments: The research was supported financially by subprogram 010701.

Keywords: *Insects, Scelionidae Republic of Moldova, taxonomy, species, genus, Codrîi Reserve.*

**CONTRIBUTIONS TO THE KNOWLEDGE OF SPECIES FROM THE
GENUS *COLLETES* LATREILLE, 1802 (HYMENOPTERA: APOIDEA) IN
THE REPUBLIC OF MOLDOVA**

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In the Republic of Moldova, solitary bees play a vital role in pollinating agricultural crops and maintaining biodiversity, serving as pillars of local ecosystems. Unlike honeybees, solitary bees are exceptional pollinators for fruit trees (e.g., apples, plums, cherries), leguminous crops, and wild plants in Moldova's meadows and orchards, directly supporting agricultural production and preserving native flora. Studies indicate that some solitary species are more efficient pollinators due to their active foraging behavior and adaptation to the region's variable climatic conditions.

In the context of increasing vulnerability, factors such as the reduction of natural habitats (due to deforestation and urbanization), pesticide use in agriculture, and the lack of nesting sites threaten their survival. Protecting them has become urgent, especially in an agrarian country like Moldova, where natural pollination supports local economies and food security. Initiatives such as promoting eco-friendly agricultural practices could boost solitary bee populations. Thus, their conservation is not only an ecological issue but also an economic one, essential for the sustainability of Moldova's environment.

The genus *Colletes* Latreille, 1802, represents a significant group of solitary pollinators. Research on this genus was primarily conducted in the 1990s, and collected specimens are preserved in entomological collections, which provide valuable data for monitoring of this pollinator group in the Republic of Moldova. This study is the inventory of species from the genus *Colletes* Latreille, 1802, stored in the Entomology Museum of the Institute of Zoology, Moldova State University in Chişinău. The information includes collection dates and locations, as well as the names of collectors and identifiers. These records enhance the understanding of the distribution and diversity of this genus within the Republic of Moldova, supporting further ecological and conservation efforts. The entomological material was collected by Andreev A. and Stratan V., in the localities Leuşeni, Comrat, Cimişeni, Chetrosu, Chişinău, Tigheci and Lozova-between 1866 and 1991 years.

The aim of this study was to analyze entomological collections of *genus Colletes*, housed in the Institute of Zoology from Chişinău. A total of 8 species from the genus *Colletes* were identified: *Colletes cunicularius* (Linnaeus, 1761), *Colletes nasutus* (Smith, 1853), *Colletes pallescens* (Noskiewicz, 1936), *Colletes succinctus* (Linnaeus, 1758), *Colletes spectabilis* (Morawitz, 1868), *Colletes marginatus* (Smith, 1846), *Colletes fodiens* (Fourcroy, 1785) and *Colletes mlokoszewiczi* (Radoszkowski, 1891).

The species with the most collected specimens are *C. spectabilis* and *C. succinctus*, with 21 and 5 specimens, respectively. The oldest recorded specimen dates

back to 1866 and belongs to *C. cunicularius*, reflecting the major importance attributed to this key group of pollinators and the long-standing tradition of local entomological research. Unfortunately the label of this specimens does not include the collector's name, only the locality – Chişinău.

The entomological collection of the Institute of Zoology is one of the richest in the country, housing a valuable insect repository, including pollinator species of the genus *Colletes*. Studying these materials contributes to strengthening taxonomic and biogeographic knowledge. However, additional field research is necessary to update data on the current status of this insect group, ensuring accurate monitoring and conservation strategies.

Acknowledgments: *The research was supported by subprogram 010701 ZOOAQUATERRA “Evaluation of the structure and functioning of animal world and aquatic ecosystems under the influence of biotic and abiotic factors in the context of ensuring ecological security and the well-being of the population”.*

Keywords: *Apoidae, pollinators, entomological collections, species.*

DIVERSITY OF BATS (CHIROPTERA) IN THE LIMESTONE MINES AT CAPRESTI, REPUBLIC OF MOLDOVA

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The northern part of the Republic of Moldova is characterized by plateaus and cliffs with steep limestone slopes. In these cliffs there are abandoned mines that represent one of the most important roosts for bat species in the Republic of Moldova during hibernation, reproduction and as summer shelter. Research was carried out in the limestone mines of Capresti, which is a new research site and is located on the left bank of the Raut River (47.751 N, 28.452' E). The mine is mechanically excavated, on the walls and ceiling there are multiple cracks left from stone extraction activities. The study took place in 2024 during the bats' reproduction period in August and the bats' pre-hibernation period in November. Five species of bats were recorded: *Rhinolophus hipposideros*, *Myotis daubentonii*, *M. dasycneme*, *M. mystacinus* and *Plecotus auritus* from two families (Rhinolophidae and Vespertilionidae). The most numerous were individuals of the species *M. daubentonii* 46.15% and *P. auritus* 38.46%.

The diversity and abundance of species is relatively low. The number of bats is lower in August during the mating season than in November when bats hibernate. This is due to the active period of intense insect hunting and alternative shelters in the vicinity. During the mating period in August, only 10 bats were identified, while during the hibernation period in November 16 individuals were identified. As we can observe from the data obtained, the site is important for bats in both periods. During the hibernation stage, the numerical abundance is higher because there are optimal conditions for bats. At the end of August, bats can be found also in other shelters such as caves, cracks, holes, bridges near the mine.

The low population number and diversity are due to the type of mine which is small in size with short corridors. Another factor is human activity in the mine, burning tires and garbage at the entrance to the mine and inside it. Climatic factors have less influence because no flooded or collapsed places have been observed. The mine require protection to preserve the diversity of the bat fauna, because the importance of bats as insectivores is irreplaceable in the food chains.

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Keywords: bats, hibernation, diversity, abundance, rock mines.

EDAPHIC MESOFAUNA IN NATURA 2000 GRASSLANDS OF NORTHEASTERN ROMANIA

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The aim of this paper is to conduct a comparative analysis of the structure of edaphic mesofauna communities in two types of grassland habitats in Northeastern Romania, in order to assess the impact of ecological and anthropogenic factors on the diversity and distribution of these organisms in Natura 2000 sites.

Two types of grasslands were considered: halophilous grasslands (Probota, Vlădeni, Valea Ilenei) and Ponto-Sarmatic meso-xerophilous grasslands (Mârzești, Bârca), both included in the Natura 2000 ecological network. The studies were based on quantitative and qualitative analysis of soil microarthropods, particularly mites (orders Mesostigmata, Trombidiformes, Oribatida, and Astigmatina) and springtails (Entognatha). Mesofauna extraction was performed using the Tullgren–Berlese method, as improved by Balogh.

The results indicate a clear dominance of mites in all five stations, representing up to 82% of the total mesofauna in some cases. The highest densities were recorded in the halophilous grasslands of Valea Ilenei (546.3 individuals/100 cm²) and in the strictly protected area of Mârzești (274.6 individuals/100 cm²). Oribatid mites, which are detritivores and microphytophages, were predominant in more stable and well-preserved habitats, while Trombidiformes, with a varied trophic regime, were better represented in the meso-xerophilous grasslands affected by grazing. Springtails and Acaridae (Astigmatina) were poorly represented in all sites, as these groups are sensitive to salinity, drought, or soil compaction caused by grazing.

The coefficient of variation and standard deviation indicated a heterogeneous spatial distribution of the mesofauna, while the trophic structure of the communities highlighted differences depending on the degree of conservation, habitat type, and anthropogenic pressures.

The conclusions support the use of edaphic mesofauna, especially mites and springtails, as effective bioindicators in assessing soil health and the effectiveness of conservation measures applied in Natura 2000 habitats in the region.

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Keywords: *biodiversity, microarthropods, bioindicators, soil health, protected ecosystems*

CURRENT SITUATION OF THE INFESTATION DEGREE OF WEEDS IN SUNFLOWER CROP

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The sunflower is part of the order Compositales (Asterales), the family Compositae (Asteraceae), is a plant that is cultivated on large areas in our country, especially in Dobrogea, the Romanian Plain and the West. In Romania, in the sunflower crop, there is a high level of infestation with annual and perennial weed species, associated with a high diversity of them, which determines a pronounced competition for the development of the crop plant, negatively influencing the production of grains and the quality obtained per hectare in the absence of the application of adequate control measures. The weeds in sunflower crops need a thorough study of their lifestyle and behavior in the climatic conditions of Fundulea, especially due to the fact that they have different biological properties compared to the crop plant.

During the period 2020-2024, the sunflower crop presents a high and different degree of infestation (60-95%) with characteristic species, depending on the location area, the applied technological links and the preceding plant. The cause of the appearance of different weed species is correlated with climatic aspects, with the seed reserve in the soil and with the low power of the plant to compete. During that period, the research focused on determining the weeds, identifying and predominance of existing weed species in untreated variants located on the cambic chernozem soil type (3.2% OM; 37 clay, Ph 6.5) in the experimental field - Agrotechnics laboratory at NARDI- FUNDULEA.

The main objective of the work was to study the weed species and identify the "problem" weeds (*Setaria viridis*, *Echinochloa crus - galli*, *Sorghum halepense*, *Xanthium strumarium*, *Ambrosia.sp.*, *Cirsium arvense*) present because each year, agricultural production losses are significant and expenses are high.

The presence of annual and perennial weeds in sunflower cultivation throughout the vegetation period is a reality that causes various quantitative (by reducing the level of production) and qualitative (by decreasing the quality of the crops) problems.

Keywords: sunflower, density, degree of infestation, weeds.

GEOSPATIAL AND MULTIVARIATE DRIVERS OF ELEMENTAL COMPOSITION IN MOSS BIOMONITORING: INSIGHTS FROM GEORGIA AND MOLDOVA MOSS SURVEY 2020

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The variation in content of elements in mosses can be influenced by many factors. Environmental conditions, such as rainfall, wind, and humidity, affect element deposition and retention on the moss surfaces. Proximity to pollution sources, like industrial areas or heavy traffic, significantly increases exposure to airborne metals. Moss species differences also play a role, as their morphology and physiology impact element accumulation. Soil composition and local geology may contribute through dust resuspension. Additionally, atmospheric deposition patterns, including long-range transport of pollutants, can lead to regional variations. These factors must be considered to accurately interpret biomonitoring data and assess environmental pollution levels.

Principal Component Analysis (PCA) is a powerful multivariate statistical tool used in moss biomonitoring studies to reduce complex datasets into interpretable patterns, helping distinguish between natural and anthropogenic sources of elements. When combined with supplementary environmental GIS data such as climate variables, landscape characteristics, altitude, etc. PCA can provide more accurate source allocation and reveal hidden influences on element accumulation in mosses.

Georgia and Moldova 2020 moss survey PCA results, showed that the most suitable qualitative variables for illustrating the separation between individuals in a PCA plot, listed in decreasing order of relevance, were altitude zones, forest type, climate, and landscape. These results highlight the critical importance of integrating ecological, geographical, and anthropogenic variables to enhance the reliability of biomonitoring data interpretation and enable spatially precise environmental risk evaluations.

Keywords: *moss biomonitoring, Principal Component Analysis (PCA), geospatial integration, altitude zonation.*

PARASITIC SPECIES IDENTIFIED IN THE YELLOW-NECKED MOUSE

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The yellow-necked mouse (*Apodemus flavicollis*, Melchior, 1837) is a common species in deciduous forests and can be found both within forest biotopes and at their ecotones. The aim of this research is identification of parasitic species in the yellow-necked mouse.

Laboratory investigations were carried out through the complete dissection of 15 *A. flavicollis* specimens (8 ♀, 7 ♂) and microscopic examination of the musculature and internal organs to identify parasitic species. Species identification was based on morphological criteria, while taxonomic classification by the Fauna Europaea system.

The taxonomic structure includes 3 classes, 6 families, 7 genera, and 8 parasitic species. The diversity of the parasitic fauna comprises four species from the class Cestoda (*Skrjabinotaenia lobata* – 13.3%, *Catenotaenia cricetorum* – 6.67%, *Paranoplocephala omphaloides* – 13.3%, *Rodentolepis straminea* – 13.3%), three species from the class Secernentea (*Syphacia stroma* – 58.4%, *Syphacia obvelata* – 33.3%, *Heligmosomoides polygyrus* – 6.7%), and one species from the class Adenophorea (*Trichuris muris* – 20.0%).

The most widespread species are ageohelminths (*Syphacia stroma*, *S. obvelata*) and geohelminths (*Trichuris muris*), which develop without intermediate hosts, and whose larvae are resistant, living freely in the environment or on the fur of animals.

Monitoring the parasitic fauna in small rodents has bioecological, medical, and veterinary significance in preventing the transmission of pathogens (zoonotic, epizootic) to humans and animals

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Keywords: yellow-necked mouse, *Apodemus flavicollis*, parasitic species

INDUCTION OF RHIZOGENESIS IN Highbush Blueberry (*Vaccinium corymbosum* L.) in Tissue Culture

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The research was conducted in the Embryology and Biotechnology Laboratory of the “Alexandru Ciubotaru” National Botanical Garden (Institute). The main objectives of the research were to propagate this crop *in vitro* and to obtain uncontaminated, genetically homogeneous, high-quality planting material within a relatively short period. To induce the rhizogenesis process, the microclones obtained following the microcloning process were placed in 100% and 50% WPM medium, supplemented with low concentrations of the Indole-3-butyric acid (IBA), Indole-3-acetic acid (IAA) and α -naphthylacetic acid (NAA). Both agar-gelled and liquid rhizogenic media were tested. Root formation was observed 3-4 weeks after placing the plantlets in rhizogenic nutrient media. Plantlets grown on agar-gelled medium exhibited a delayed rhizogenesis process, typically taking 2-3 months, and developed a less robust root system compared to those grown in liquid medium. This weaker root development adversely affected their acclimatization, and the rooting rate for plantlets in agar-gelled medium was approximately 50%.

Following the research conducted, significant differences were observed in the values of the rooting rate of *Vaccinium corymbosum* L. plantlets, which were attributed to the influence of the WPM basic medium. On the 100% WPM nutrient medium, most of the plantlets formed callus at the base, and the root system was poorly developed. On the 50% WPM nutrient medium, the formed root system was more vigorous and branched, and the percentage of rooted plantlets increased significantly. Also, the rooting rate and the quality of the root system were significantly influenced by the supplementation of the nutrient medium with auxins.

The study revealed that the most favorable culture medium for inducing rhizogenesis in this species is 50% WPM nutrient medium supplemented with IAA (0.5 mg/l). The plantlets placed on this culture medium had a higher rooting rate (about 90%) than those placed on nutrient medium supplemented with IBA (70-80%) and (NAA) (50-60%).

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Keywords: tissue culture, rhizogenesis, nutrient medium, auxins.

MENTHA L. SPECIES AT RISK PRESERVED IN THE NATIONAL BOTANICAL GARDEN

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The paper refers to two species of global conservation interest from *Mentha* L. genus (*M. gattefossei* Maire and *M. cervina* L.). The species are of great importance not only medicinally but also for national and international *ex situ* conservation programs, being listed in the Red List of the IUCN with the status of vulnerable species [VU] (*M. gattefossei*) and near threatened [NT] for *M. cervina*. The distribution area of the species is very limited and the number of natural populations is continuously decreasing as a result of intensive collection for medicinal purposes, as a food source, and for the extraction of volatile oil.

In the Republic of Moldova these species are maintained in the Medicinal Plant Collection of National Botanical Garden (Institute) of MSU, having been obtained through the international exchange of seeds (*Index Seminum*). The research was focused on monitoring the behaviour of plants in the pedo-climatic conditions of our country, different propagation procedures, bio-morphological and chemical profiles. Both *Mentha* species systematically achieve the budding, flowering and fruiting phases, gradually increasing the productivity potential of the aerial and underground organs. In both species, the flowering period begins in the first decade of June and lasts until the end of July. The fruiting stage is noted in the first decade of August. The vegetation period lasts 136-155 days, the flowering stage – 55-60 days. Plant propagation was carried out in a vegetative way, through green cuttings, stolons and plant fragmentation. The most successful method of propagation is by stolons (8-10 cm long, with 2-3 nodes each). For ensuring the initial propagation material for conservation purposes or for a possible expansion on larger areas, the method of multiplication by green cuttings can also be used.

As a result of the studies we can briefly mention that the local pedo-climatic conditions are quite favourable for the normal development of plants; the plants showed an excellent primary acclimatization, bloom abundantly, reaching full maturity of the seeds with a high germination rate. The plants accumulate a relatively large amount of volatile oil under the conditions of the Republic of Moldova and the specific chemical composition is of interest for pharmaceutical, cosmetic and food industries.

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Keywords: *Mentha*, medicinal plants, *ex situ* conservation.

BUNIAS ORIENTALIS L. IN THE COLLECTIONS OF THE “ALEXANDRU CIUBOTARU” NATIONAL BOTANICAL GARDEN (INSTITUTE)

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Bunias orientalis L. – commonly known as Turkish wartycabbage, warty-cabbage, or hill mustard (Romanian: *brăbin oriental*, Russian: *свербига восточная*) – is native to the Mediterranean Basin, Asia Minor, the Caucasus, Western Siberia, and Central Asia. At the “Alexandru Ciubotaru” National Botanical Garden (Institute), this species has been included in the collections of fodder, melliferous (honey) and energy plants, as subject of ongoing research to assess its potential for valorization. *B. orientalis* is a biennial or perennial herbaceous plant characterized by an erect, branched stem; basal leaves with long petioles and stem leaves with shorter petioles. It produces small, yellow flowers arranged in dense racemes. Under the climatic conditions of the Republic of Moldova, the species completes its ontogenetic cycle starting from the second year of vegetation, being able to flower, bear fruit and produce seeds. Seed germination capacity is relatively low ($2 \pm 0.82\%$). However, viable seeds can be used to produce seedlings, which are suitable for transplantation when they reach a height of 12-16 cm and develop 4-5 true leaves. The plant is early-season, with the growing season beginning in mid- to late March. By early April, plants enter the generative phase (marked by bud formation). The flowering stage extends from mid-May to early June, with 9-12 open flowers and 5-6 buds commonly present simultaneously within a single inflorescence. During the flowering stage, *B. orientalis* serves as a rich source of nectar and pollen, attracting a diverse array of pollinating insects. Observations resulted in the identification of insect species from six families – Apidae, Halictidae, Argidae, Formicidae, Syrphidae, and Scarabaeidae – as frequent visitors, all playing significant roles in pollination. Given its high melliferous value, *Bunias orientalis* L. is recommended for inclusion in honey plant cultivation systems, contributing to the establishment of a continuous nectar flow (“honey conveyor”).

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Keywords: *Bunias orientalis* L., development, phenology, insects.

EFFECT OF DROUGHT AND SALINITY ON THE CORRELATION AND VARIABILITY OF TRAITS IN MAIZE SEEDLINGS

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Identification of maize genotypes with increased resistance to drought and salinity is an important task in breeding of this crop. The introduction of drought - resistant maize genotypes allows to increase productivity by at least 15%. It has been shown that genes responsible for resistance to abiotic stresses were identified in maize seedlings, and it was also found that the effect of drought on maize seed germination caused differential expression of a large number of genes. The first objective of this study was to investigate the variability of some traits of maize hybrids at the early stages of plant growth and development under stressful conditions of drought and salinity. The second objective was to select genotypes with increased resistance to these abiotic stresses.

Twelve hybrid maize genotypes were used as the initial material. The genotypes belong to different flowering groups and three of them were from the early flowering group, two genotypes represented the mid-flowering group and seven hybrids were from the late flowering group. Ten inbred lines (P101, P502, Mo17, P165, XL12, M11, A239, L1866, L459, Co125) were used as parental genotypes for these hybrid combinations. The seeds were germinated in osmotic solutions (1.9-2.0 MPa) and in NaCl solutions (3%) for 7 days. Then the values of the features "seedling length", "rootlet length" and "number of rootlets" were determined. The obtained data were processed using methods of correlation, regression and dispersion analysis.

Under osmotic stress conditions at the early stages of plant growth and development, a fairly high frequency of growth of seedlings and rootlets was noted, on average 81.8%, however, under the action of salt stress, this indicator was significantly lower - 62.5%. Under stressful conditions, 4 genotypes did not show a growth response. The average values of the traits "seedling length", "rootlet length" and "number of rootlets" and the values of their variances and variation coefficients were also higher under the influence of drought. The highest values of the variation coefficients under stress conditions were noted for the trait "seedling length", and the lowest - for the trait "number of rootlets". Correlation analysis revealed the presence of reliable positive relationships between the traits studied in the experiment. Under conditions of both stresses, the highest values of the correlation and determination coefficients were determined for the traits "seedling length" and "rootlet length" ($r = 0.72^{***}$, $r^2 = 0.52^{***}$). At the same time, the correlations of these features with such a feature as "number of rootlets" were weaker, and the values of the determination coefficients were almost two times smaller ($r^2 = 0.27^{***}$ and $r^2 = 0.25^{***}$, respectively). Under the influence of osmotic stress, approximately the same values of the determination coefficients between the feature "number of rootlets" and the features "rootlet length" and "seedling length" were calculated, $r^2 = 0.26^{***}$

and $r^2 = 0.28^{***}$, respectively. Under drought conditions, the lowest value of the correlation coefficient of the features "seedling length" and "rootlet length" was noted, its value was 0.69^{***} . Under saline conditions, reliable positive correlations were revealed between all the studied features. It should be noted that the coefficients of correlation and determination between the traits "seedling length" and "rootlet length" ($r=0.85^{***}$, $r^2=0.73^{***}$), as well as between the traits "rootlet length" and "number of rootlets" ($r=0.62^{***}$, $r^2=0.38^{***}$), were the highest in the experiment and in comparison with the same indicators under the influence of drought and on average for both stresses. Comparison of the values of the regression coefficients in different traits "seedling length" and the traits "rootlet length", "number of rootlets" showed that under the action of drought, these indicators were higher, especially between the traits "seedling length" and "rootlet length" ($b_{yx} = 0.35^{***}$ (NaCl stress) and $b_{yx} = 1.29^{***}$ (osmotic stress)). On average for two stresses, the highest values of the regression coefficients were found between the traits "seedling length" and "number of rootlets", ($b_{yx} = 1.24^{***}$), and the smallest - between the traits "seedling length" and "rootlet length" ($b_{yx}=0.77^{***}$). The reliability of the dependence of the variability of traits on the influence of stress factors was confirmed by variance analysis. On average, the greatest effect of the "genotype" factor under stress conditions was noted for the "number of rootlets" trait, and the smallest effect of this factor was determined for the "rootlet length" trait. Under conditions of osmotic stress, the value of the effect of the "genotype" factor was also the greatest for the "number of roots" trait, while similar indicators for the "seedling length" and "rootlet length" traits were significantly lower and were also inferior to the values of the "genotype" factor effect under the influence of salt stress. The values of the determination coefficients, as well as the effect of the "genotype" factor for all traits were higher under NaCl stress conditions in comparison with similar indicators under drought conditions. The average values of the coefficients of determination for each of the characteristics studied under stressful conditions were reliable and turned out to be at a high level (0.72^{***} - 0.8^{***}). Analysis of the variability of the indicators of these traits for each genotype allowed to identify 3 genotypes that are most resistant to these stress factors, and this hybrids included the early flowering line L1866 as one of the parental genotypes.

Thus, the reliable dependence of the variability of traits "seedling length", "rootlet length" and "number of rootlets" in the early stages of growth and development of maize seedlings on the effects of drought and salinity was shown. The correlations of traits depending on the type of stress were revealed, their quantitative dependencies were determined. The effects of the «genotype» factor for each trait and type of stress were identified. The hybrids with increased resistance were selected. The traits "seedling length", "rootlet length" and "number of rootlets" are effective criteria for assessing the resistance of maize genotypes to drought and salinity.

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Keywords: *maize, drought, salinity, seedling length, correlation, resistance.*

CHARACTERIZATION OF CLIMATE RISKS DURING THE COLD SEASON AND ADAPTATION METHODS

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The influence of climate change has already become visible to society, regardless of the climate zone in which the society is located or the time of year. The severity of climate change is an indication that urgent adaptation measures are needed.

Aim: It consists in the identification and characterization of climate risks in the cold period of the year that to some extent affect the population, economy, infrastructure, agriculture and environment of the Republic of Moldova, followed by the identification of all methods of adaptation of the population to climate risks in the cold period.

Objectives: To determine cold season climate risks and identify adaptation methods by: improving weather warning systems, local contingency plans in case of a cold season climate risk, modernization and adaptation of infrastructure to possible climate risks.

Methods: The study will include the analysis of historical climate data (temperature, precipitation amounts), the impact of climatic phenomena produced in previous years as well as theoretical principles through weather reports, climate change studies and other geographic methods for estimating the negative impact of the risk weather-climatic phenomena in time and space, with the use of Geographic Information Systems that will allow the elaboration of maps.

The results obtained will allow the implementation of new methods of adaptation and protection of the population, environment, agriculture and infrastructure as well as a detailed analysis of all climate risks in the cold season that occur or may occur on the territory of Moldova.

Conclusions: Global climate change is intensifying and increasing the impact of weather-climatic risk phenomena in the cold season, and in recent years there has been significant major damage and people have suffered. Monitoring weather and hydrological regimes through stationary networks is essential for early warning of the population, prevention and mitigation of weather-climatic risk phenomena leads to the reduction of people suffering and property damage.

Keywords: *weather-climatic phenomena, cold period, impact, risk, adaptation.*

EPILOBIUM ANGUSTIFOLIUM L. – A PROMISING SPECIES WITH HIGH THERAPEUTIC POTENTIAL

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The study included the identification of morpho-biological development features of the species *Epilobium angustifolium* L., phenological observations, the identification of optimal propagation methods and the bibliographic study on its therapeutic importance, for the purpose of further phytochemical research. The investigations were conducted during 2020-2024, in the “Plant Resources” Laboratory.

Epilobium angustifolium L., commonly known as fireweed, is a plant native to Eurasia and North America. It is common on the territory of the Carpathian Mountains. In the Republic of Moldova, it grows in clearings, forest edges, especially in the beech and spruce areas, where it is found sporadically. It is an herbaceous, perennial plant of the Onagraceae Juss. family, which has a thick, creeping rhizome in the soil. The erect, cylindrical, slightly ridged, glabrous stem reaches 70-120 cm in height, under the local conditions. The leaves are lanceolate, alternate, short-petiolate, finely toothed. Inflorescence – raceme. The flowers are bright pink-purple, with pendulous buds, arranged in a terminal raceme. The full flowering stage occurs in July-August. The fruits are reddish capsules with short hairs. To encourage abundant flowering, the old flowers are removed before seeds are produced. It reproduces both by seeds and by rhizomes. It can be propagated by direct sowing in the ground and by division in spring or autumn. Fireweed grows best in full sun or in partial shade and in sandy-clayey, well-drained soil. The plant can tolerate well frosts.

The aerial parts of the plant, rhizomes and roots have practical uses. The plant has a pleasant smell. Among its active principles, there are pentacyclic terpenic acids, polyholosides, pectins, mucilages, flavonoids, essential oil, fatty acids, tannins, vitamin C, mineral salts. Due to its rich phytochemical content, the plant is used for liver and digestive disorders, prostatitis, kidney inflammation, irritable bowel syndrome. It has been scientifically proven to inhibit the proliferation of human cells in prostate, breast and brain cancer. Another study demonstrated anti-inflammatory and antioxidant activity. The plant is recommended for skin conditions, asthma, whooping cough and menstrual disorders. Thanks to its properties, it is beneficial in case of gastrointestinal disorders. Due to its soothing and astringent effects, the tea from the root and leaves helps relieving muscle cramps. It is a basic component in cosmetic and dermatological preparations. An ointment prepared from the leaves can be applied to treat skin diseases in children. The leaves have toning effect for the skin, so they can be used in bath water to soothe sensitive areas. It is a honey plant, frequently visited by bees and butterflies.

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Keywords: therapeutic potential, active principle, cosmetics, gastronomy.

**DETERMINATION OF THE STORAGE POTENTIAL OF FENUGREEK
(*TRIGONELLA FOENUM-GRÆCUM* L.) SEEDS FROM THE ACTIVE
COLLECTION OF THE PLANT GENE BANK**

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The aim of this research was to study the morphophysiological and biochemical parameters of fenugreek seeds after accelerated ageing (AA) test. These parameters allow characterisation of the storage potential (SP) of accessions in active collections of the genebank with the purpose of their *ex situ* conservation.

The objects of studies were accessions of fenugreek seeds (family *Fabaceae*, genus *Trigonella*) from the Gene Bank. SP of seeds was determined by two tests: test for AA of seeds by Hampton and TeKrony's method and test for electrical conductivity (EC) of solutions. These tests are included in the International Rules for Seed Testing (ISTA). AA test of fenugreek seeds was carried out under elevated air temperature (42°C), air humidity (90-100%), aging time (72 h). We suggest other conditions of AA test: air temperature – 43°C, air humidity - 80-90%, aging time - 48 hours. After this test, various parameters of seeds were measured according to the ISTA: germination power (GP), germinability (G) of seeds, radicle length, fresh biomass of radicles, electrolyte leakage. The activity of the enzyme peroxidase was measured in the radicles of the seedlings. The data were processed using *Statistica 7* software. After AA test, GP and G of seeds were 28.5 and 42.2%, control - 50.0 and 97.7% respectively. Crude biomass decreased on average by 180.0 mg after the test compared to the control. The electrical conductivity of solutions containing aged seeds increased by 3.2 mS/m² compared to the control. The peroxidase activity increased approximately 1.6-fold after the test compared to the control, i.e. the response to thermal stress was significant (control - 0.225 u.u., experience - 0.360 u.u.).

Conclusions: AA-test of seeds and determination of morphophysiological parameters allowed evaluation of SP of fenugreek seeds. Positive correlation of germinability of fenugreek seeds with germination power, radicle length, fresh biomass of seedlings was revealed after conducting AA test.

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Keywords: fenugreek, accelerated aging, germination, storage potential, gene bank.

NEW DATA ON THE DIVERSITY OF COLEOPTERS (INSECTA: COCCINELLIDAE) IN ALFALFA CROP

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Alfalfa is a forage crop used in the livestock sector for its rich content of nutrients such as protein. Being a perennial and mesophilous plant, it contributes to improving the ecological environment of the agro-landscape, improves the physical and chemical properties of the soil, forms and restores its structure, and is also an excellent melliferous plant. It is known that in agrocenoses, over several years of monoculture, specific insect communities are formed, which often include harmful, useful and invasive species. Beneficial insects in agricultural ecosystems require protection despite agricultural activities. Thus, the alfalfa crop was selected and studies were conducted on the species diversity and coccinellid communities formed.

Collections of coccinellids from the alfalfa fields were carried out on April (4, 12, 16, 29, 30), May (3, 27, 30), June (10, 25), July (30) and August (16, 26) of 2024 year. The coccinellids were collected using an entomological net with a diameter of 30 cm. A sample is composed of 100 netting, from each field being collected 2-3 samples. Some specimens were collected manually. The faunistic materials were collected in the localities: Bahmut, Băcioi, Bulboaca, Butuceni, Bursuc, Chiriliceni, Dolna, Leuntea, Plop, Poruceni, Sadova, Sipoteni, Sărata, Răzești, Slobozia, Vărăncău, Rogojeni, Telița, Trebujeni, Vărzărești, Vulcănești and Plaiul Fagului Scientific Reserve. In total, 2532 specimens of coccinellids were collected in the alfalfa crop, assigned to 15 species and 12 genera: *Subcoccinella vigintiquatuorpunctata* (Linnaeus, 1758) (1471 ex.), *Coccinella septempunctata* (Linnaeus, 1758) (347), *Hippodamia variegata* (Goeze, 1777) (302), *Propylea quatuordecimpunctata* (Linnaeus, 1758) (138), *Scymnus frontalis* (Fabricius, 1787) (115), *Coccinula quatuordecimpunctulata* (Linnaeus, 1758) (64), *Harmonia axyridis* (Pallas, 1773) (56), *Tythaspis sedecimpunctata* (Linnaeus, 1758) (13), *Stethorus pusillus* (Herbst, 1797) (11), *Psyllobora vigintiduopunctata* (Linnaeus, 1758) (6), *Coccinella magnifica* (Redtenbacher, 1843) (5), *Ceratomegilla undecimnotata* (Schneider, 1792) (1), *Hippodamia tredecimpunctata* (Linnaeus, 1758) (1), *Nephus bipunctatus* (Kugelann, 1794) (1) și *Nephus redtenbacheri* (Mulsant, 1846) (1). The dominant species in the alfalfa crop was *Subcoccinella vigintiquatuorpunctata* (Linnaeus, 1758) with a number of 1471 specimens, species called also the alfalfa ladybug. The species has two generations per year and overwinters as adults at the base of dry alfalfa plants. Alfalfa is attacked by both the adult and larva of this species, by gnawing the lower epidermis and the leaf parenchyma, thus leaving the upper epidermis intact. The attacked leaves twist and dry, the insects causing significant damage during the spring-summer growing season.

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Keywords: crop, alfalfa, coccinellids, species, diversity.

INFLUENCE OF STRESS TEMPERATURE ON THE GROWTH OF *FUSARIUM OXYSPORUM* FUNGUS

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In relation to the major impact of climate change on biodiversity, the aim of the present research was to establish the influence of temperature on the growth of *F. oxysporum* var. *orthoceras* (*F.o.o.*) isolates, extracted from common winter wheat plants, cultivated in the central and southern areas of the Republic of Moldova.

Methods. A number of 40 *F.o.o.* isolates were used in the research, extracted from the basal part of wheat stems with rot symptoms. Wheat samples were collected in Braviceni, Mitoc (Orhei), Chisinau (experimental sector of the IGFPP, MSU), Bacioi (Ialoveni), Leova, Gotești (Cantemir), Doina (Cahul). *F.o.o.* isolates were inoculated on PDA medium in Petri dishes and maintained in the following thermal conditions: i) 24°C (8 days), ii) 24/9/24°C (4/2/2 days); iii) 24/35/24°C (4/2/2 days). Colony growth was recorded based on the average of 2 perpendicular diameters. Statistical data analysis was performed in the STATISTICA 7 software package.

Results. It was found that the isolates under study show a wide range of mycelial pigmentation – pink, pale pink, gray pink, yellow pink, dark pink, light lilac, dark lilac, etc. The ratio of the diameter of the colonies on the last day of growth (day 8) compared to day 4 at the optimal temperature (24°C) varied within the limits of 183.0 ... 206.8%, and until the maintenance in limiting temperature conditions – 24/9/24°C –152.2 .. 165.3% and 24/35/24°C –133.8 .. 185.7%. This means that the 35°C temperature caused a more specific reaction of the *F.o.o.* isolates compared to the temperature of 9°C. It should be noted that the highest colony growth capacity, maintained for 2 days at temperatures of 9 and 35°C, was recorded for the isolates extracted from the plants taken from Mitoc: 165.3 and 185.7%. Cluster analysis (*k*-means) determined that *F.o.o.* isolates more successfully separated into groups based on growth at 24°C than at 24/9/24°C and especially at 24/35/24°C.

Conclusions. The study of 40 isolates of *F. oxysporum* var. *orthoceras*, collected in the central and southern areas of the Republic of Moldova demonstrated *in vitro* conditions a wide diversity of mycelium colors and their high adaptability to extreme temperatures (9 and 35°C) for the growth of *Fusarium* fungi, which denotes the existence of a pronounced genetic polymorphism of these disease agents.

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Keywords: colony diameter, character, *Fusarium oxysporum*, diversity.

DIVERSITY OF COMMON WHEAT COLLECTION GENOTYPES BASED ON PRODUCTIVITY ELEMENTS

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Plant collections represent an important genetic heritage for scientific research, and also constitute a valuable initial material in breeding programs. The comparative study of collection plants in years with different climatic conditions provides truthful information about the vulnerabilities of different characters, phenotypic observations largely reflecting their genotype. The aim of the research was to establish the degree of diversity of common wheat collection genotypes based on the morphometric analysis of some productivity elements.

Methods. The research was conducted on 45 genotypes of common winter wheat collection (different ecological-geographic origin), cultivated on the experimental sector of IGFP, MSU in 2021-2024. We note that the years 2022, 2024 were unfavorable for the cultivation of many agricultural crops, including common wheat due to high temperatures and lack of precipitation. The mass of grains per spike (g) and the elements associated with spike productivity – spike length (cm), number of spikelets per spike, number of grains per spike, mass of one grain (mg), 20 spikes for each genotype were analyzed. The data were statistically processed – cluster analysis methods, multidimensional scanning, in the STATISTICA 7 software package.

Results. Distribution dendrograms and multidimensional scanning demonstrated the influence of environmental conditions on the cluster organization of genotypes. Cluster analysis (k-means) demonstrated that the highest values of the basic character - grain mass per spike were recorded in 2023: 3.19 ... 3.49 g.

A cluster of genotypes with relatively high grain mass indices per spike was identified in the study years: 2.98; 3.34; 3.49; 2.55 g, respectively, 2021, 2022, 2023, 2024. This cluster included the varieties Selania, Aluniș, Balada, BȚ 43-42, Trublion, Zvitlaga, Miranda, Amor, Odeschi 267, Rotax and the L 642-19 line.

Conclusions. The study of the common winter wheat collection, representing 45 forms of different ecological-geographic origin, during the years 2021-2024, highlighted genotypes with high values of ear productivity, both in optimal and drought conditions, which demonstrates their high resilience.

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Keywords: common wheat, genotypes, diversity, productivity, spike.

PROTEIN AND LIPID CONTENT IN CHICKPEA LINES (*CICER ARIETINUM* L.)

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In this short communication presented results investigation content proteins and lipids in grains at 10 lines of chickpea, namely: LC5, LC17, LC90/2, LC24, LC22, LC14b, LC23, LC21, LA190 and LA204 obtained by breeding on productivity from 2 crosses MDI02432×MDI02419 and cv. Botna × cv. Ichel, 8(denom. LC) and 2(LA), respectively. As check was used cv. Ichel.

The objective of studies: evaluating lines on protein and lipid content in grain, determination relationship with grain size (hundred grain weight) and selection the lines with the best performance. To determine protein content was used method Bradford, lipid content determined by extraction their ether diethyl (probe with flour). Both determination was conducted in 4 repetitions.

As results analysis on protein content were obtained following values: LC5(16.65%), LC17(17.15%), LC90/2(17.31%), LC24(17.13%), LC22(17.43%), LC14b (17.24%), LC23(17.02%), LC21(17.12%), LA190(17.22%) LA204 (17.28%) and check cv. Ichel (16.38%). Range of protein content in lines constituted 16.65%(LC5) – 17.43%(LC22). Line LC5 by content is the closest to cv. Ichel, all the others a little superior the check, at range 0.64%(LC23) – 1.05%(LC22). Lipid content in investigated genotypes: the highest performance had line LC21(7.03%) followed by LC24(6.84%), LC14b (6.73%), LC23(6.41%), LA190(6.36%), LC17(6.25%), cv. Ichel (6.24%), LC90/2(6.14%), LA204 (6.0%) LC5(5.81%) and LC22(5.15%). Range of lipid content were in limits 5.15%(LC22) – 7.03%(LC21). Variability: lipid content is more variable CV=8,29% than protein one CV=1,76%. No found relationship between performance proteins and lipids ($r = -0.076$). *Hundred grain weight* of genotypes range within 26.1g(LC22) – 30.1g(LC5). Moderate negative correlation was determined between *proteins content values* and *hundred grain weight* ($r = -0.471$) and moderate positive one between *lipid content* and *HGW* ($r = 0.406$).

Conclusion: as a result of evaluating 10 lines for protein content line LC5 slightly, others a little (insignificantly) superior check cv. Ichel, in regard to lipid content lines LC21, LC24 and LC14b exceeded check on 0.79%, 0.6% and 0.49% respectively, lines: LC23 and LA190 slightly superior the check. Thus, in terms of protein and lipid content it should be recommended lines: LC21, LC24, LC14b, LC23 and LA190.

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Keywords: chickpea's breeding lines, protein, lipid, hundred grain weight.

INFLUENCE OF ALGAL PREPARATION ON THE GERMINATION CAPACITY OF SUNFLOWER SEEDS

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Sunflower is the main oilseed crop in many countries of the world. The oil content of the seeds of modern sunflower varieties and hybrids reaches 45–58%, and the protein content is 17–21%. The vegetable oil obtained from this crop is an important component of the food ration for both humans and animals. Sunflower also has a valuable potential for use as feed in animal husbandry, with multiple benefits attested following application. In order to obtain high sunflower yields, in addition to respecting technological factors and cultivation conditions, an essential aspect is seed germination and its stimulation by the use of biological preparations. From the category of these products, those of algal origin are effective and affordable, having a role in stimulating germination, increasing plant vigor and productivity, as well as in improving soil biota, thus contributing to its quality. In this context, we aimed to evaluate the influence of the preparation "ALGE EN-1" on the germination of sunflower seeds (variety LG 56.63 CL), preventively treated with chemical fungicides. The preparation "ALGE EN-1" is an organic product obtained from green edaphic algae, in a living state, of intense green color. The experiments were carried out under laboratory conditions, at a temperature of 19–20°C and natural lighting. Two variants were tested: variant 1 (control) - the seeds were sprayed with distilled water; variant 2 - the seeds were sprayed intensively with the preparation "ALGE EN-1". In each variant, 100 seeds were used, in three repetitions. After treatment, the seeds were sown in peat cassettes, at a depth of 4 cm. The samples were subsequently moistened with distilled water, in equal amounts, to maintain the optimal humidity necessary for germination. During the experiment, the following were analyzed: germination capacity and seedling height. As a result of the research, it was found that treating sunflower seeds with the algal preparation "ALGE EN-1" stimulates their germination. Thus, the germination capacity in the control variant was $82.60 \pm 0.40\%$, and in the treated variant - $87.51 \pm 0.35\%$. Also, in the treated variant, an increase in the aerial part of the seedlings by approximately $16.24 \pm 0.72\%$ was recorded. In conclusion, the preparation "ALGE EN-1" manifested a biostimulating effect on the germination of sunflower seeds.

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Keywords: *ALGAE EN-1, sunflower, seed germination.*

ANALYSIS OF THE GROWTH PROCESS OF THE CYANOBACTERIUM *NOSTOC GELATINOSUM* (SCHOUSB) ELENK. ON SOME NUTRIENT MEDIA

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Cultivation of cyanobacteria of the genus *Nostoc*, in order to obtain biomass with multiple applications, has been, is and will remain a continuous concern of scientific researchers. This fact is argued both by the effects obtained from the use of these organisms, and by their special properties manifested in culture and in practical applications. Among the cyanobacteria of this genus is the species *Nostoc gelatinosum* (Schousb.) Elenk., which is of particular interest for use, primarily, in agriculture. It is worth mentioning that the cultivation of this species, like other representatives of the genus *Nostoc*, is quite difficult, which hinders the development of industrial-scale production systems. One of the main factors determining the accumulation of cyanobacterial biomass is the selection of the optimal nutrient medium for culture. For this reason, in the present study we aimed to identify the optimal nutrient medium for *N. gelatinosum*, in order to obtain an increased biomass. The *N. gelatinosum* strain used in the experiments was cultivated, according to the periodic method, on two nutrient media: M.S. Taha (M) and Kratz & Myers (C), which differ mainly in the content of K, P, Fe and S. The cyanobacteria were cultivated under laboratory conditions, at a temperature of 25 °C, under continuous illumination of 3000 lux, without periodic shaking of the samples. The experiments were carried out in Erlenmeyer flasks with a total volume of 100 ml, containing 100 ml of nutrient medium, and the algal inoculum was 0.4 g/L each variant was exposed in 6 repetitions. The duration of the experiments was 12 days. Quantitative analysis of the cyanobacterial biomass showed that the strain was in an exponential growth phase. The most significant growth was observed between days 3–12, a period in which a significant accumulation of biomass was recorded. On day 12, the biomass increased 15.5 times on the M nutrient medium and 14.97 times on the C nutrient medium. The total amount of biomass obtained on day 12 was as follows: on the M medium – 6.20 ± 0.29 g/L, and on the C medium – 5.99 ± 0.20 g/L. The evaluation of the pH values of the nutrient media did not reveal significant differences between the variants. On both media, at the end of the experiment, the biomass was positioned at the surface of the liquid, having a reddish-brown color, with the formation of bubbles on the surface, being tightly bound in a gelatinous form and enclosing a significant amount of liquid solution. In conclusion, both nutrient media are suitable for cultivating *N. gelatinosum* under laboratory conditions, but the M medium ensures a slightly higher accumulation of biomass, which indicates a greater efficiency in supporting growth.

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Keywords: cyanobacteria, *N. gelatinosum*, nutrient media

**THE EFFECT OF WASTEWATER FROM *SPIRULINA PLATENSIS*
CULTURE ON THE GERMINATION PROCESS OF *PANICUM*
MILIACEUM L. SEEDS MAINTAINED IN COLLECTIONS**

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The industrial cultivation of *Spirulina platensis* generates biomass with multiple applications, but also significant amounts of wastewater, which need to be efficiently utilized, including by using them as biostimulators of seed germination. In order to utilize the wastewater resulting from the cultivation of the cyanobacterium *Spirulina platensis*, we aimed to study their effect on the germination of *Panicum miliaceum* L. seeds, maintained under collection conditions for two years. The interest in cultivating *P. miliaceum* is justified by its increased resistance to drought, its use as animal feed, green manure, protection of the vegetation cover and seed production. In the present research, the seeds of *Panicum miliaceum* L. provided by Dr. Victor Țiței were used. The wastewater from the cultivation of the cyanobacterium *Spirulina platensis* was obtained by centrifuging the suspension on the 20th day of cultivation, at a speed of 6000 rpm. The biostimulator was prepared by thermal activation of the separated culture liquid. In the experiments, solutions with concentrations of 1%, 2% and 4% were used, obtained by diluting the culture liquid with distilled water. The tested seeds, 100 for each experimental batch, were treated with the biostimulator for 1, 2 and 4 hours, and the same seeds exposed to distilled water for the same time intervals served as a control. To study the germination process, the seeds were placed in Petri dishes, on filter paper moistened with distilled water, in natural light and at a temperature of 22°C. During the experiments, the germination capacity of the seeds was analyzed. Thus, on the first day after treatment, no germinated seeds were recorded in any of the experimental variants. On the second day, 14–46% of the seeds germinated in the variants treated with biostimulator, and 6–14% in the control variant. On the third day, 18–46% germinated in the treated variants, and 8–34% in the control ones. On the fourth day, 40–52% germinated in the treated variants, and 40–50% in the control ones. The most favorable time for treating seeds with biostimulator was 2–4 hours, which led to obtaining the highest values of germination capacity (52%). In conclusion, wastewater generated from the cultivation of the cyanobacterium *Spirulina platensis* creates favorable conditions for being utilized as biostimulators for the germination of *Panicum miliaceum* L. seeds maintained under collection conditions.

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Keywords: wastewater, *Spirulina platensis*, seeds, sorghum.

THE USE OF THE BEECH TREE BY THE ROMANIAN PEOPLE

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Among the most valuable forest trees in the world, including in Romanian space, is the beech. It is a very tall (up to 35 meters) and robust tree. In universal culture, the beech is a symbol of prosperity and divinity. Among the Romanian people, the beech has not really been researched. Thus, in this material we have set out to present some aspects of the usefulness of the beech tree among that people. In the Romanian space, beech was valued by woodworkers because its wood was used on a large scale in construction, in the production of tools, furniture, chests, household items, cart wheels, etc. Cobza were also made from beech wood due to the fact that beech wood has a dense and elastic texture, which contributed to obtaining a clear sound. In many Romanian regions, beech fruit oil ("jir") was used, which quickly rancid. But this oil contains phagine, a substance that causes dizziness if consumed in large quantities. The seeds were a valuable food for sheep and pigs. The leaves contain tannins. The young, raw ones have a slightly sour taste and some villagers even eat them. The plant has a therapeutic importance in Romanian human medicine. The tar extracted from the wood is used to treat skin diseases (dermatitis) and respiratory tract diseases. The bark is used as a febrifuge, antidiarrheal and bitter tonic. The medicine obtained by boiling beech wood ash with water is used to treat warts. The buds are recommended for urinary lithiasis. In the Maramuresh region, it is believed that in order not to grow old (to be young) during the summer, it is recommended to eat the first beech leaves that appear and it is necessarily to do this thing with the right hand brought behind the back of the head. Also, at the beginning of spring, it is considered to protect the household from evil spirits that take the fruit of the harvests, the milk of the cattle and the health of the children by placing a beech branch at the household gate. At the end of this material, we find that the beech tree had vast uses for the Romanian people.

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Keywords: *beech, food, folk medicine.*

APPLICATION OF ALGAE STRAINS PRODUCING BIOACTIVE SUBSTANCES IN ANIMAL HUSBANDRY AND CROP PRODUCT

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The alarming depletion of natural resources necessitates the identification of non-traditional sources for sustaining human society. One such source is algae, whose reproductive capacity and the chemical composition of their synthesized biomass are significantly superior to those of the most valuable cultivated plants.

Three groups of algal strains have been selected: producers of edible proteins and biologically active substances, nitrogen-fixing strains, and agents for the biological purification of wastewater from poultry and livestock complexes.

Among the algae that produce edible proteins and biologically active substances, we can mention: *Spirulina platensis*, *Dunaliella salina*, *Chlamydomonas reinhardtii*, *Haematococcus pluvialis*. Administering the biomass of these strains as a supplement in the nutrition of poultry and domestic animals increases their productivity by 25-30%, and the resulting production is highly favorable.

Research conducted in recent years shows that administering the biomass or extracts from the biomass of algae that produce biologically active substances in the manufacturing of medicinal products or cosmetic creams enhances the effectiveness and value of these products. Using *Spirulina* biomass as a human dietary supplement increases the body's resistance to various diseases and contributes to the longevity of youth.

A significant role in the sustainable development of agriculture is played by nitrogen-fixing algae (*Nostoc muscarum*, *N. commune*, *Tolypothrix*, *Cylindrospermum*). Experiments have shown that algalization of the soil with one of these strains contributes to the accumulation of about 150-160 kg N/ha – the amount of nitrogen needed to obtain 3500-3800 kg/ha of wheat.

Currently, algae are increasingly used as agents for the biological purification of wastewater from poultry and livestock complexes. These include: *Chlorella vulgaris*, *Scenedesmus acutus*, *Micractinium pulchellum*, *Synechocystis salina*, *Chaetomorpha linum*. Step-by-step algalization of biological basins in wastewater treatment systems from poultry and livestock complexes with one or a consortium of strains from this group ensures the extraction from water of up to 95–97% of nitrogen, phosphorus, carbon, and other pollutants. The resulting biomass can be used as a supplement in animal and poultry feed or as organic fertilizer. The economic benefit of applying this method, depending on the productivity of the livestock complex, can amount to tens or even hundreds of thousands of euros.

Keywords: *algae, animal husbandry, crop product*

CONTRIBUTIONS TO THE KNOWLEDGE ON COLEOPTERAN IN THE NATURAL BIOCENOSES OF THE "ORHEI" NATIONAL PARK, REPUBLIC OF MOLDOVA

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Orhei National Park, formally designated in 2013 through a resolution by the Parliament of the Republic of Moldova, is situated in the central region of the country, approximately 46 km north of Chişinău. Encompassing an area of 33,844 hectares – of which 18,550 hectares are forested – the park represents a mosaic of ecological systems. These range from naturally and semi-naturally functioning ecosystems to landscapes undergoing various degrees of anthropogenic influence and artificial transformation, forming a dynamic framework of biodiversity and ecological processes.

The research was conducted based on an integrative analysis of entomological collections housed at the Museum of Entomology of the Institute of Zoology, Moldova State University (MSU). The study also drew upon specialized literature published over the past two centuries, as well as original field collections carried out during 2007–2008 and 2023–2024 in various natural biocenoses within Orhei National Park and its adjacent areas.

As a result of original field investigations, the analysis of entomological collections housed at the Museum of Entomology, and a review of specialized literature spanning the past two centuries, a total of 235 beetle species, belonging to 98 genera and 11 families, have been documented within the territory of Orhei National Park. The most diverse family was Carabidae, comprising 131 species, followed by Scarabaeidae with 33 species and Aphodidae with 25 species. The remaining families – *Silphidae*, *Rutelidae*, *Geotrupidae*, *Glaphyridae*, *Dynastidae*, *Melolonthidae*, *Cetoniidae*, and *Lucanidae* – were represented by a limited number of species. In addition, nine rare beetle species were identified, all listed in the 3rd edition of the Red Book of the Republic of Moldova: *Calosoma sycophanta*, *Carabus intricatus*, *Carabus ullrichi*, *Carabus variolosus*, and *Carabus clathratus* (Carabidae); *Lucanus cervus* (Lucanidae); *Osmoderma barnabita* and *Oryctes nasicornis* (Dynastidae); and *Protaetia aeruginosa* (Cetoniidae). One of these species – *Osmoderma barnabita* – is also included in the IUCN Global Red List. Furthermore, two species – *Osmoderma barnabita* and *Lucanus cervus* – are protected under the Bern Convention, and both are also listed in Annexes II and IV of the European Union Habitats Directive.

Given the ongoing national concern regarding the decline or even disappearance of numerous plant and animal species in Moldova, biodiversity conservation has become a top priority. In this regard, Orhei National Park has the potential to play a crucial role in halting biodiversity loss and possibly facilitating the recovery of endangered species populations within its boundaries.

Acknowledgments: *This study was supported by the research project 010701 "Evaluation of the structure and functioning of the animal world and aquatic ecosystems under the influence of biotic and abiotic factors in the context of ensuring ecological security and the well-being of the population.*

Keywords: *coleopteran fauna, diversity, rare species.*

NEW PROKARYOTES IN THE CHERNOZEM OF THE REPUBLIC OF MOLDOVA

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The work provides quantitative and qualitative characteristics of the prokaryotic community in the typical chernozem. Using high-throughput sequencing, a taxonomic analysis of the structure and diversity of prokaryotic communities was performed. Soil was sampled under different plants from the forage crop rotation, which was in its fifth rotation: triticale for grain (2020), soybean for grain (2021) and winter wheat (2022). The phyla of bacteria and archaea that make up the main part of the soil prokaryotic community were identified: *Pseudomonadota*, *Actinomycetota*, *Bacteroidota*, *Bacillota*, *Acidobacteriota*; *Verrucomicrobiota*, *Planctomycetota*, *Myxococcota*, *Nitrospirota*, *Gemmatimonadota*, *Cyanobacteriota*, *Patescibacteria*, *Chloroflexota*, *Fibrobacterota* and *Crenarchaeota*.

The identified microbiome had a similar composition throughout the studies, differing in the proportion of components represented in the community. Among the identified prokaryotes, the highest abundance was recorded by microorganisms from the *Bacteria* domain (82.16–88.34%). The leading position in this indicator was occupied by representatives of the *Pseudomonadota* phylum (25.11–31.21%). Reaching the highest value in 2021 (31.21%), they maintained their leading position, although in other years of research, the values were lower (30.31–25.11%). They were followed by representatives of the *Actinobacteriota* (24.01–26.47%). The third most representative was the archaeal phylum *Crenarchaeota* (11.66–17.84%).

In fact, they microorganisms are ubiquitous in soil and water and have a wide range of properties: they form symbiotic relationships with plant roots, are nitrogen fixers and/or participate in the decomposition of dead organic matter, are part of the gut microbiome of humans and animals, contribute to soil health by recycling nutrients and decomposing waste, and can play an important role in the nitrogen and carbon cycles. At the same time, they contain many pathogens for plants, animals, and humans, and are also excellent sources of antibiotics and other biologically active substances, etc.

According to the International Committee on Prokaryotic Taxonomy (2021), the phyla are new, identified and/or confirmed by metagenomic analysis.

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Keywords: prokaryotes, bacteria and archaea, 16S rRNA gene, taxonomic composition.

**RECONSTRUCTION OF CLIMATIC EVENTS FROM THE 16TH
CENTURY IN TRANSYLVANIA: INTERDISCIPLINARY ANALYSIS
BASED ON HISTORICAL SOURCES**

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The present study uses an interdisciplinary approach, analyzing written documents such as chronicles, diaries, and official records to extract data related to climatic events in the 16th century Principality of Transylvania (present-day Romania). The results obtained were processed using statistical techniques to reconstruct climate variability during the period. The study identifies multiple testimonies associated with extreme weather phenomena, including unusually hot summers and several years with excess precipitation or droughts. These extraordinary climatic events had profound effects on society, contributing to food shortages and increased mortality from famine and disease (especially plague). Finally, the manuscript highlights the significant role of climate in shaping the historical and socio-economic landscape of 16th century Transylvania, providing insights into the complex interactions between climate and human society.

SCIENTISTS' VIEWS ON CLIMATE CHANGE OVER THE PAST 150 YEARS

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The paper presents the position of scientists regarding climate phenomena over the past 150 years. The authors identified three periods, a warmer one between the 1920s and 1930s, a colder one between the 1960s and 1980s, and a warmer one again between the 1990s and present, in which scientists of the time made serious, imperative statements, real fears regarding climate change from warm to cold and back to warm. Noting that in the first two periods scientists were clearly wrong about climate change, the authors ask themselves whether scientists are not currently making the same mistake due to the fact that the current warming period does not exceed that of the 1920s and 1930s, especially since then the anthropogenic influence was considerably smaller, almost insignificant. Finally, it is concluded that the climate has had significant variations from warm and dry years with significant droughts with heat waves that generated thousands, tens of thousands of deaths in the 1920s-1930s, to the cold highlighted by the recording of absolute minimums after the 1940s. Furthermore, both the long and severe winters with frequent freezing of inland rivers and seas in temperate and cold areas in the 1960s-1980s are also mentioned, as well as the warming accompanied by a decrease in precipitation, as well as the appearance of dry intervals, or dangerous meteorological phenomena, both in winter and summer. We also mention the melting of ice caps, especially in the Arctic, but also the retreat of mountain glaciers. Thus, in the last 150 years the climate has not changed, proof that the same manifestations have been repeated without the bio-pedo-geographic zonality being changed.

CONTRIBUTIONS ON THE STUDY OF THE CONSERVATION OF SOME CROP WILD RELATIVES IN THE ROSOȘENI FOREST NATURE RESERVE

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Crop wild relatives (CWR) represent an important domain of plant genetic resources for food and agriculture (PGRFA), their role is significant in the implementation of crop breeding programs. In the flora of the Republic of Moldova, CWR live in various natural ecosystems, including within the State protected natural areas.

The aim of our research was to inventory the current status of the populations of these plant organisms in the Rosoșeni Forest Nature Reserve. Field investigations included GPS-positioning of plant communities, evaluation of quantitative indices (height, diameter of trees, etc.), their health status and *in situ* conservation prospects.

The Rosoșeni Reserve is located northwest of the town of Briceni and occupies an area of 147.5 ha. The protected area consists of various stands with alternating areas of grassy vegetation. In stands of pedunculate oak (*Quercus robur*) some valuable species of CWR were recorded. The wild pear (*Pyrus pyraeaster*) was detected at altitudes of 263-272 m and had a height of 8-18 m, the diameter of the trunk – 15-46 cm. The trunk of wild cherry trees (*Prunus avium*) was 6-18 m with a diameter of 10-55 cm. The wild apple (*Malus sylvestris*) was sporadically encountered, and the estimated height of the specimens did not exceed 7 m. In the shrub layer, the cornelian cherry (*Cornus mas*) and the hazel (*Corylus avellana*) are of particular interest. It should be noted that pronounced abiotic stresses in recent years have negatively influenced the growth and development of plants in forest communities.

Conclusions. Some crop wild relatives were evaluated in the Rosoșeni Nature Reserve within the stands, shrub layer and herb layer. Global climate change requires the development of more demanding activities for the guaranteed conservation of CWR.

Acknowledgments: The research was conducted within the framework of Subprogram 011102 “Expansion and conservation of genetic diversity, improvement of crop gene pool under climate change conditions”, financed by the Ministry of Education and Science”.

Keywords: crop wild relatives, protected natural areas, GPS-positioning, stands.

OPTIMIZATION OF THE CONDITIONS FOR *IN VITRO* INITIATION OF THE SPECIES *STERNBERGIA COLCHICIFLORA*

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Sternbergia colchiciflora is a critically endangered species listed in the Red Book of the Republic of Moldova. Until now, its conservation through tissue culture techniques has not been explored in our country. In the context of accelerating habitat loss and increasing anthropogenic pressures, the application of modern biotechnological methods has become a strategic priority for the conservation of rare plant species.

The present study aims at optimizing the conditions for the *in vitro* initiation of this species. While based on the classical stages of tissue culture, the methods were adapted to enhance the efficiency of this process. The biological material used consisted of juvenile bulbs with a diameter of 0.5-1.0 cm, collected from the natural habitat. Because of the high degree of contamination of the plant material, particular emphasis was placed on the development of an effective asepsis protocol. The tested protocol included the prior exposure of the bulbs to UV radiation for 30 minutes, followed by treatment with a fungicidal solution and multiple rinses. Subsequent steps included immersion in 5% *sodium hypochlorite* with the addition of a commercial detergent, followed by sterilization using 0.2% *mercury chloride* (HgCl₂). In some experimental variants, *sodium dichloroisocyanurate* (NaDCC) solution was added to increase sterilization efficiency. This combination of disinfectants effectively reduced contamination levels while maintaining explant viability. The evaluation of the results was focused on the contamination rate and survival of the explants after initiation. The obtained data confirm the feasibility of using the tissue culture techniques for *S. colchiciflora*, providing a starting point for the development of a reproducible micropropagation protocol. This process contributes to the sustainable conservation of this endangered species, while also offering prospects for the use of biotechnological methods in the protection of rare plant species.

Acknowledgments: The research was conducted within the project: 20.80009.7007.19 (2020-2023) „The introduction and development of technologies for propagation and cultivation of new species of woody plants by conventional techniques and tissue culture” and the subprogram 010101 „Research and ex situ and in situ conservation of plant diversity in the Republic of Moldova” (2024-2027).

Keywords: *Sternbergia colchiciflora*, *in vitro*, optimization.

PHOTOSYNTHETIC PIGMENT CONTENT IN PLUM TREES DEPENDING ON GROWING CONDITIONS

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Research in the field is mainly focused on the development, cultivation and physiological studies of fruit trees. The main goal is to highlight the most informative physiological indicators of different varieties under the exogenous influence of various environmental factors. Plants, being sedentary organisms, are constantly exposed to fluctuations in environmental factors.

The object of study will be plum trees of two late varieties: Stanley (of foreign selection) and Udlinionnaia (of local selection). The planned scientific research will be carried out during the vegetation period, in lysimeters. In total, we will have 2 variants: the experimental variant: plants grown in conditions of insufficient moisture and the control variant: plants grown in optimal growth conditions (with irrigation). The concentration of pigments was determined using a T60U spectrophotometer according to their optical density. One of the most important indices characterizing the influence of external conditions on plants is the content of chlorophyll pigments - chlorophylls a and b and carotenoids in the leaves. The dynamics of the accumulation of photosynthetic pigments in all varieties and variants is identical. We can see that the experimental variant significantly modified the content of chlorophyll and carotenoids in the leaves of plum plants. The content of chlorophyll a, b and carotenoids in the control variant is higher than in the experimental variant.

According to the average content of chlorophylls in the leaves of the control and experimental plum trees, the differences are 1 -9% and according to the content of carotenoids 1 - 3%. A greater difference between the variants is observed in the Udlinionnaia variety, regarding the content of pigments, throughout the vegetation period, even in July when daytime temperatures were abnormally high than normal, and the amount of precipitation lower than normal. We can also observe that the total level of pigment and carotenoid content in the leaves of plum plants is higher in the control variant.

The activity of the photosynthetic apparatus of plum trees and their resistance to the action of unfavorable factors was studied. As a result of the research carried out, we came to the conclusion that the amount of photosynthetic pigments changes depending on the variety, the age and productivity of the trees and environmental conditions.

Acknowledgments: *The research was conducted within the framework of Subprogram 011101 Genetic and biotechnological approaches to agroecosystem management under climate change, funded by the Ministry of Education and Research. The research was conducted within the doctoral project "Cyto-physiological adaptation of plum trees to environmental factors and the impact on productivity.*

Keywords: *plum trees, environmental factors, leaves, drought, chlorophyll pigments.*

VITIS VINIFERA X MUSCADINIA ROTUNDIFOLIA INTERSPECIFIC HYBRIDS FOR ECOLOGICAL VITICULTURE

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From very distant times on the current territory of Romania and the Republic of Moldova, one of the main occupations of the native population was viticulture. This noble and profitable occupation was a stable source of food and healthy products for the locals. The local grapevine assortment has undergone numerous changes during very difficult times, being affected by wars and various calamities that caused many of the old local varieties to disappear without a trace. However, some old varieties are still cultivated today. These varieties have adapted very well over the centuries and have a high yield and stable production. However, in recent decades, local varieties are increasingly affected by changing climatic conditions. This occurs due to their low genetic plasticity, which does not allow the full manifestation of their fruit-bearing capacity. Modern viticulture aims to obtain rich harvests with minimal resource consumption. Local varieties can only partially ensure this objective, being sometimes surpassed by climate change phenomena. Sometimes local grapevine varieties are affected by adverse climatic conditions - late spring and early autumn frosts, heavy rains that cause the development of pathogenic fungi, as well as very low temperatures during the vegetative rest period. As a result of satisfying this need and ensuring rich grape harvests, after a long selection process, the rhizogenic interspecific varieties *Vitis Vinifera* x *Muscadinia Rotundifolia* were created. They possess a high adaptive potential and increased genetic plasticity. This allows for a stable and high-quality harvest even when adverse weather phenomena occur. After crossing the genotypes of *V. vinifera* L. (2n=38) x *M. rotundifolia* Michx. (2n=40) were obtained and homologated interspecific rhizogenic grapevine genotypes with table grapes: "Nistreană", "Malena", "Algumax", "Sarmis" and with grapes for fresh consumption and processing: "Alexandrina", "Augustina", "Ametist" and Thetys.

This genotypes are planted in the experimental grapevine sector of the institute. The key for the further development of ecological viticulture in Moldova, Romania and other viticultural zones of the world may rely on implementing the existing rhizogenical interspecific varieties, and also in breeding new performant ones. With their successful implementation the process of grapevine planting material will be simplified just at cuttings rooting, due to the fact that no grafting is needed. The new obtained plants will have a longer lifespan, good adaptability, drought and frost tolerance and a high resistance to pest and diseases. With this genotypes, the zone of grapevine cultivation can be extended to the northern areas of the Republic.

Acknowledgments: Research was carried out within the Research Subprogram 011102. Increasing and conservation of genetic diversity, agricultural crop breeding in the context of climate change, financed by the Ministry of Education and Research.

Keywords: ecological viticulture, interspecific genotypes, climate changes, genetical plasticity, yield.

**THE IMPACT OF TEMPERATURES ON THE ONTOGENETIC CYCLE
DEVELOPMENT OF THE ENTOMOPHAGOUS *BRACON HEBETOR*
(HYMENOPTERA: BRACONIDAE).**

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The entomophagous *Bracon hebetor* is a valuable and beneficial species with significant potential in biological plant protection. Due to its ability to parasitize the larvae of several pests, this species can play a crucial role in the natural control of harmful insect populations. In recent decades, scientific research conducted internationally has been focused on identifying and optimizing strategies for using the entomophagous *Bracon hebetor* in biological control programs for agricultural pests. These investigations have targeted both aspects related to the ecology and ethology of the entomophagous insect, as well as the development of efficient methods of multiplication and controlled release in agrobiological ecosystems. Given the significant impact of climate change on ecological structures and the dynamics of insect populations, the need to develop advanced technologies for the reproduction and maintenance of the entomophagous insect *Bracon hebetor* under strictly controlled laboratory conditions is imperative.

In experiments conducted under controlled laboratory conditions, the ontogenetic development of the entomophage *Bracon hebetor* was investigated using as host the larvae of the species *Galleria mellonella*, a biological model frequently used in parasitism studies. The research was designed to evaluate the influence of thermal factors on the biological parameters of this biological control agent, an experimental range of ambient temperature being established between 15 and 30°C. The main objective of the study was to determine the critical thermal thresholds, necessary for the complete development of the entomophage's ontogenetic cycle, from opposition to adult emergence. To monitor the development of the ontogenetic cycle, three pairs of the entomophage *Bracon hebetor* and three larvae of the laboratory host *Galleria mellonella* were used. Monitoring the interaction between the entomophage and the host aims to identify the optimal temperature for completing the biological development cycle of the entomophage. Thus, it was demonstrated that the influence of temperature on the development cycle of the entomophage *Bracon hebetor* highlights its different stages (egg, larva, pupa and imago) at specific temperatures. It was found that at low temperatures (8-10°C), the entomophagous *Bracon hebetor* cannot complete its life cycle. At a temperature of 14-16°C, the development cycle lasts approximately 32 days and females lay an average of 22.6% of the total eggs. At the same time, at a temperature of 18-20°C, a significant acceleration of development occurs (14-15 days) and females lay an average of 29.0% of the total eggs.

It has also been demonstrated that at extreme temperatures (30-32°C), development is inhibited, which suggests that these temperatures are not favorable for

the life cycle of the entomophage.

Experimental analysis of the influence of thermal factors on the development of the entomophage *Bracon hebetor* reveals that this entomophage has an optimal life cycle at moderate temperatures, between 18 and 27°C. In this thermal range, ontogenesis takes place under optimal conditions, and the total duration of development from the egg stage to the adult is significantly reduced, favoring an increased reproduction rate and maximum efficiency in parasitizing the host larvae. On the other hand, extreme temperatures, below 10°C and above 30°C, generate a negative impact on the development process of this entomophage, causing the extension of ontogenetic stages, the reduction of survival rate and, implicitly, the decrease in its effectiveness in the biological control of harmful lepidopteran populations.

In this context, the integration of the entomophagous *Bracon hebetor* into biological plant protection programs represents a fundamental strategy for reducing the use of chemically synthesized phytosanitary products, thus reducing the risks associated with environmental pollution and toxic impact on non-target organisms. The implementation of this biocontrol agent contributes not only to optimizing pest management in agroecosystems, but also to maintaining ecological balance, favoring a functional biodiversity essential for the sustainability of modern agriculture.

Therefore, the entomophagous *Bracon hebetor* can become an indispensable element in organic and integrated farming systems, offering a sustainable solution for pest management and supporting sustainable agricultural practices. The use of this parasitoid in the biological control of harmful lepidopterans represents a viable alternative to conventional crop protection methods, contributing to the production of safe food, free of toxic residues and protecting human health.

Given the significant potential of this insect, it is necessary to intensify scientific research aimed at optimizing multiplication methods under controlled conditions and developing efficient release and acclimatization techniques in agricultural ecosystems. Promoting these studies will facilitate the integration of the *Bracon hebetor* insect into sustainable pest control strategies, contributing to reducing dependence on conventional insecticides and diminishing their negative impact on the environment and public health.

Acknowledgments: *The research was carried out within the Subprogram 011103 Development of ecologically harmless means of reducing the impact of harmful organisms of agricultural crops against the background of climate change, funded by the Ministry of Education and Research.*

Keywords: *entomophagous, Bracon hebetor, ontogenetic cycle, temperature, laboratory host.*

TESTING THE EFFECTIVENESS OF PESTICIDES FOR SEED TREATMENT IN THE CONTROL OF WIREWORMS

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Due to their multi-year biological cycle, frequency and intensity of damage, wireworms are serious soil pests of several crops, including corn. Corn is susceptible to wireworms (Elateridae) from germination to the phenological stage of the eighth leaf, and sometimes a little later to the stage of twelve leaves at the first stages of plant development. One of the aims of these studies was to examine the impact of the treatment on seed germination and morphometric traits in the field (germination and plant damage) and controlled conditions (shoot and root length, fresh and dry mass). During the vegetation period of 2024, four different pesticides (Fortenza 600FS, Lumiposa 625 FS, Force 20 CS and Redigo M) were tested on two maize genotypes (G 1 and G 2) in the V3 phase in order to test their influence on the morphometric properties.

A high percentage of sprouted plants (90.31% - 94.06%) was recorded for both genotypes and insecticide treatments. A significant reduction in the number of plants damaged by larvae of the Elateridae family compared to the control was observed with the application of the tested pesticides. Seed treatments with Fortenza 600FS and Lumiposa 625 FS reduced the number of attacked plants and affected the degree of damage from wireworm larvae, with no damage to the seeds and sprouts of both genotypes. In addition, the above treatments had a positive effect on the length of roots and shoots, as well as their fresh weight. In the treatment with Force 20 CS and Redigo M, an inhibitory effect was observed in the second genotype, with the fresh weight of the roots reduced by 9.23% and 10.77%, and the shoot by 11.43% and 6.57%. In the same genotype, a decrease in shoot and root dry mass was recorded in almost all treatments.

As expected, there was a close correlation between growth traits, so plants with better germination energy were stronger with greater shoot length and fresh mass. Analyzing the effect of insecticides for seed treatment on the plant in both genotypes, germination energy of 100%, better vigor rate, and length and weight of aerial parts were established in comparison to fungicide treatment and untreated control.

Also, a very important conclusion is that the tested pesticides for seed treatment provide satisfactory germination and control of wireworms, based on the field and controlled conditions.

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Keywords: filed emergence, plant damages, seed treatment, corn, wireworms.

EFFECTIVENESS OF SULPHUR SC IN COMBATING THE COMMON MITE IN PROTECTED AREAS

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The problem of environmental pollution with pesticides is very acute, especially in protected areas, biorational products can largely solve these problems without polluting the environment. Sulphur is an essential element used in organic agriculture, with proven biological effectiveness in combating mites. Sulphur is a contact insecticide that acts through several mechanisms which affect the respiratory system of pests by inhibiting cellular respiration. The scheme of the experiment on testing and evaluating the biological efficacy of the harmless organic preparation Sulphur SC in combating mites in pepper crops in 2024 consisted of four variants: preparations in two doses of 5.0 l/ha and 10.0 l/ha, the standard preparation and the untreated control. Each variant contained the same number of plants, including model plants, which serve to carry out records, before and after treatments. The pepper seedlings were planted on 02.05.2024 in a number of 120 plants. The biological efficacy of the concentrations of the studied preparation was calculated when the economic damage threshold was exceeded.

The biological effectiveness of treatments with two doses of Sulphur SC were determined based on data obtained from the records made right before first treatment, at 24 hours, on the 3rd day and on the 7th day after treatments. Results showed that the dose of 10.0 l/ha consistently ensured the highest biological efficacy, reaching a peak of 83.41% in 24 hours after the second treatment and maintaining a high level of 77.95% even 7 days after application. In comparison, the dose of 5.0 l/ha showed a significantly lower efficiency, with a maximum of 77.93% in 24 hours after the second treatment, but with a more pronounced decrease over time, reaching 59.07% after 7 days from the first treatment. The standard had a consistently lower efficiency in all monitored stages. These results clearly highlight that the dose of 10.0 l/ha of Sulphur SC is significantly more effective than the dose of 5.0 l/ha and provides more durable control against the common mite.

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Keywords: SC Sulphur, common mite, biological effectiveness, biorational products.

SOME BIOLOGICAL FEATURES AND BIOCHEMICAL COMPOSITION OF BIOMASS FROM TALL FESCUE

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Tall fescue – *Festuca arundinacea* Schreb. (syn. *Lolium arundinaceum* (Schreb.) Darbys., Family Poaceae) is a long-lived, tuft-forming, cool-season perennial C₃ species. It is well adapted to a wide range of growing conditions and is widely distributed across Europe and northern Asia, particularly in meadows.

The main objective of this research was to evaluate specific biological characteristics and the biochemical composition of the biomass harvested from tall fescue plants, and to assess its suitability as both fodder for animals and feedstock for biogas production.

The study focused on *Festuca arundinacea* cv. ‘Napoca’, grown in pure culture in an experimental plot at the NBGI MSU. This cultivar is an early-season plant, with active growth beginning in late March. The onset of the growing season is followed by a period of rapid vegetative development, with growth rates reaching up to 2.3-2.5 cm per day. Under the climatic conditions of 2024, the plants reached a maximum height of 100-105 cm by mid-May, in the flowering stage. By mid-June, the plants had entered the seed ripening stage.

The whole plants harvested at full flowering, had a dry matter content of 274 g/kg. The dry matter composition was as follows: 8.2% crude protein, 35.4% crude fiber, 68.1% neutral detergent fiber, 38.1% acid detergent fiber, 2.8% acid detergent lignin, 35.3% cellulose, 30% hemicellulose, 21.9% total soluble sugars, 9.0% ash. The nutritive value of the green biomass was characterized by the following parameters: 60.7% digestible dry matter, 56.6% digestible organic matter, 9.3 MJ/kg metabolizable energy, and 5.66 MJ/kg net energy for lactation. The dry biomass substrates of the *F. arundinacea* ‘Napoca’ cultivar also contained 505.6 g/kg carbon and 12.8 g/kg nitrogen, resulting in a C/N ratio of 39.5. The estimated biochemical methane potential of the biomass was 382 L/kg of organic matter.

Due to its adaptability and high biomass productivity, the *Festuca arundinacea* cv. ‘Napoca’ is suitable for the restoration of degraded permanent grasslands. It can also be used as a component in mixed grass-legume temporary grasslands. The harvested biomass serves as a valuable source of fodder for livestock or as a substrate in biogas production for renewable energy generation.

Acknowledgments: This study was supported by the research subprogram no. 01.01.02 “Identification of valuable forms of plant resources with multiple uses for the circular economy”

Keywords: biological features, biochemical composition, *Festuca arundinacea* ‘Napoca’.

WEEDINESS OF WINTER WHEAT CROPS AFTER VARIOUS FORECROPS

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The purpose of the investigations is to determine the species composition of weeds and their dominant role in winter wheat crops depending on forecrop.

The study was conducted in 2024 in winter wheat crops of the Department for Plant Production and Cultivar Investigations of the Yuriev Plant Production Institute of the National Academy of Agrarian Sciences of Ukraine. Weed infestation surveys were conducted simultaneously on all forecrops. A separate form was allocated for each variant, in which the identified species of weeds and contaminants (including windfall from field crop seeds) were entered after the survey. Weed plants were divided into three groups: the first (early and late spring); the second (wintering); the third (perennial). The dominant role of each species was estimated visually, based on its share in the formation of the total mass of segetal group on forecrop. Dominant were those species whose mass exceeded 10% of the total mass of all weed plants, and subdominant (3–10%), respectively.

Study results have shown that the largest species composition of weeds in winter wheat crops was after sunflower as forecrop. After black fallow as forecrop, 8 species of weeds were found, and after peas for grain and sunflower as forecrops, 8 species and 16 species, respectively. On all forecrops, the most common were early and late spring weed species, the share of which after black fallow, peas for grain and sunflower as forecrops was 87, 75 and 75% of the total number of species, respectively. *Setaria glauca*, *Echinochloa crus-galli*, *Chenopodium album*, *Amaranthus retroflexus* and *Lactuca serriola* were found against the background of all studied forecrops.

In winter wheat crops after all forecrops, *Amaranthus retroflexus* was dominant species. Also, in winter wheat crops after sunflower as forecrop, *Cirsium arvense* and sunflower windfall were subdominant species.

Thus, in the conditions of research area, the largest number of weed species in winter wheat crops was found after sunflower as forecrop (16 species). *Amaranthus retroflexus* dominated against the background of all forecrops.

Acknowledgments: This study was carried out at the expense of the budget of the Yuriev Plant Production Institute of the National Academy of Agrarian Sciences of Ukraine ("0124U000130" Development of a complex of agricultural measures to increase the productivity of modern varieties of winter wheat, spring barley and peas).

Keywords: winter wheat, forecrop, weeds.

ANALYSIS OF THE VARIABILITY OF THE WATER FLOWS OF THE BOTNA RIVER 1961-2020

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The Botna River is one of the significant rivers in the Republic of Moldova, contributing to the hydrological network and geographical landscape of the country.

The objective of the article is to examine and evaluate the fluctuations of the Botna River flows in the period 1961-2020, which will be carried out using the classical methodology for geographical studies, the main methods being: cartographic, inductive, analysis, synthesis, comparative, historical, statistical, etc. At the same time, periodic reports, atlases, as well as statistical data from the database of the State Hydrometeorological Service, the National Bureau of Statistics and other published works will be used. From the SHS archive, factual and material data on the multiannual average daily flows in the Botna River basin, from the Căușeni hydrometric station, for the period 1961-2020 will be analyzed. In the statistical processing of this information and in the spatio-temporal presentation, other programs will be used, such as ArcGIS, Qgis.

The Botna River basin is located in the central part of the Republic of Moldova and passes through two physical-geographical regions: the Codrîlor Plateau and the Lower Bâcului Plain. The Botna River passes through 3 administrative districts: Strășeni, Ialoveni and Căușeni.

The Botna River is 152 km long with an average degree of inclination of 0.24°. The hydrological regime of the basin is monitored by the State Hydrometeorological Service, at the Căușeni hydrometric station, Căușeni city. The station is located in the lower part of the basin. Thus, in the period 1961-2020, the records show that the multiannual average of the flow is 0.86 m³/s [13]. The layer of the multiannual average runoff of the Botna River is 23 mm. The multiannual average flow of the Botna River for the period 1961-1990 was 0.92 m³/s. In the period 1991-2020, it decreased by 23%, reaching a value of 0.80 m³/s. The maximum average annual flow of the Botna River was recorded in 1963, reaching a value of 2.5 m³/s, while the lowest average annual flow was recorded in 2020, with a value of only 0.076 m³/s. During the period 1961-1990, the number of years with high average annual flows was significantly higher, indicating a more balanced hydrological variability and greater availability of water resources. In contrast, during the period 1991-2020, the number of years with average annual flows higher than 1 m³/s was considerably reduced, with such values being recorded in only 6 years. This trend reflects a general decline in water resources, influenced by climate change and the impact of human activities on the hydrological regime of the Botna River.

Keywords: Botna River, watershed, water flow, drought, floods, adaptation.

MALAISE TRAP SURVEY OF BEETLES IN A TRANSITIONAL ECOSYSTEM: INSIGHTS FROM ȚAUL

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Biogeographic crossroads are areas where two or more distinct ecological or biogeographical regions meet. These areas are known for their high biological diversity and are often targeted for ecological studies and conservation efforts. The constant threat to biodiversity highlights the need to identify and evaluate these regions.

Țaul, a locality in the Dondușeni district, is situated at the junction of the North Moldavian Plateau and the Bălților Plain. It lies in a transitional zone between the forest-steppe and steppe ecosystems, making Țaul a biogeographic crossroads where species from both biomes can coexist.

The faunal survey was conducted from May to October in both 2023 and 2024. Adult beetles were collected using a Malaise trap, with an average of 18 weeks of sampling each year. To preserve biological material for later DNA analysis, the collection container was emptied on a weekly basis. The specimens were transported to the laboratory, preserved in 96% ethanol, and stored at -20°C . Morphological identification was carried out using dichotomous keys.

In total, 32 families of beetles were identified. The most numerous among them were the families Nitidulidae, Staphylinidae, Curculionidae, Scaptiidae, Mordellidae, and Chrysomelidae. The highest number of collected specimens was recorded in June.

These findings suggest that Țaul may host a diverse coleopteran community and could be of interest to future studies focused on biodiversity and conservation.

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Keywords: *Biodiversity, Coleoptera, Țaul, Malaise trap, Republic of Moldova.*

NEMATOLOGICAL RESEARCH ON SOYBEAN CULTURE IN THE CONDITIONS OF THE REPUBLIC OF MOLDOVA

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The results of the present research estimated the efficiency of the phytosanitary helminthological control in soybean grown in open field and elucidated the helminthological parasitic impact, establishing the range of the invasive nematofauna, determining the degree of impact, the structure, the frequency and the abundance of the associations. As a result of the phytosanitary research and the analysis of the helminthological impact on soybean plants, the structure of the parasitic nematode complexes was established in a number of 14 species included in 4 families: *Heteroderidae*, *Aphelenchidae*, *Hoplolaimidae*, *Tylenchidae*, of the order *Tylenchida*, class *Nematoda*, distributed according to the investigated areas and classified according to the specialization of the trophic spectrum in 5 groups. A larger number of species was detected in the sector of the Center area (10 species), as compared to the North area (8 species). It was found that the values varied from 7 to 25%, the damage being caused mainly by invasive associations of parasite nematodes of the genera: *Heterodera*, *Ditylenchus*, *Pratylenchus*, *Meloidogyne*, *Helicotylenchus*. The results of the phytosanitary monitoring contributed to elucidating the degree of nematological damage and brought new evidence in favour of applying sustainable control measures suitable for fabaceae agrocenoses.

Keywords: *nematodes, helminthological control, soybean sectors, parasitic impact, trophic specialization*

**THE SHARE OF VARIOUS FRACTIONS OF STRUCTURAL
AGGREGATES IN THE STABILIZATION OF ORGANIC CARBON IN
ARABLE CHERNOZEMS AND ITS EVOLUTION UNDER CONDITIONS
OF SANO- AND PEDOREGENERATIVE TECHNOLOGIES**

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About 90% of the total amount of organic carbon in the soil is contained in the structural aggregates and 60-80% of this is contained in the aggregates >0.25 mm. The amount of organic carbon contained in the macroaggregates is made up of the amount contained in the microaggregates that form the macroaggregates and that of the organic matter that associates them. Therefore, in native chernozems, the Corg content increases as the diameter of the aggregates increases. In arable chernozems, however, chernozem pedogenesis is carried out under conditions of organic matter deficiency, as a result of which the carbon cycle differs essentially from that of carbon in the native regime and is characterized by a unidirectional trend of Corg losses. The latter are determined by the degradation of the macroaggregates as a result of a genetically determined lower stability. As a result, in arable chernozems, the Corg content in the coarse aggregate increases as the diameter of the aggregates decreases.

According to our research in arable chernozems with maximum organic carbon losses, aggregates >10 mm are characterized, these being determined by the increased content of strongly hydrophilic non-aggregated clay as a result of unsaturation with hydrophobic humic substances (organic carbon content < 0.9 total content) and manifesting in biochemical mineralization, eluviation with downward water currents, deflation with wind. Aggregates 10-5 mm contain 0.9-1.1 total Corg content, the amount of which increases as the diameter of the aggregates decreases, and its content and balance are determined by the intercalated action of the processes of dehumus (mechanical) and dehumification (biological, biochemical, chemical). These are favored by the zero hydrostability caused by the high share of hydrophilic non-aggregated clay and the insufficient content of hydrophobic humic substances.

Aggregates 5-2 mm are characterized by an organic carbon content of 1.1-1.3 - total content but with very poor (5-3 mm) and weak (3-2 mm) hydrostability, this being caused by the high share of unaggregated clay and the partial decalcification of the clay-colloidal complex. The organic carbon content in these is inversely proportional to the diameter of the aggregates and in aggregates 3-2 mm the organic carbon content is practically identical to that of the native analogue, and implies the conclusion that carbon stabilization takes place in them. Aggregates 2-1 mm are

characterized by a humus content > 1.5 - total content in the soil at the same time their content in the soil is relatively constant and varies from one chernozem soil to another depending on the subtype and the specific landscape conditions. This allows us to consider that the formation of 2-1 mm aggregates but also of fine aggregates (1-0.25 mm) in arable chernozems is achieved by mechanisms inherited from the pre-agricultural stage. The content of the latter, however, is more variable throughout the year and correlates with the hydrostability index of aggregates > 2 mm.

Based on the above, we consider that the sequestration of organic carbon in arable chernozems is determined by the processes of formation of aggregates 7-0.25 mm and its stabilization is determined by the processes of formation of aggregates 3-0.25 mm. The maximum capacity for stabilizing organic carbon is characterized by aggregates 2-1 mm and their content is an indicator of the intensity of reproduction of the chernozem type of solidification. In this sense, our recent research has shown that the arable chernozems in the region are receptive to the procedures for sustaining the processes of reproduction of the chernozem process of solidification manifested in the reproduction of the unidirectional functionality of the pedofunctional system [bioenergetic system]↔[aggregate system]. In the composition of the aggregate system. The content of agronomically valuable aggregates (10-0.25 mm) makes up more than 80% and in their composition more than 65% belong to aggregates 7-0.25 mm. The maximum health and pedoregenerative effects are attested within the framework of biologized technologies based on No-till and Mini-till with mulch. In the composition of aggregates 7-0.25 mm more than 60% belong to hydrostable aggregates 3-0.25 mm, especially those 2-0.25 mm. In this sense, we can conclude that the content of aggregates 7-0.25 mm quantitatively characterizes the share of Corg sequestering aggregates and the content of aggregates 3-0.25 mm characterizes the share of Corg stabilizing aggregates.

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Keywords: *organic carbon, structural aggregates, carbon sequestration, carbon stabilization.*

MODERNIZED TECHNOLOGY TO MITIGATE SOIL DEGRADATION THROUGH FATIGUE IN NURSERY PLANTATIONS

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The "modernized technology" category implies a natural technogenic soil management model capable of ensuring greater health-environmental, pedoregenerative, technological and economic efficiency compared to traditionally practiced technologies. The theoretical and applied conceptual framework of the model proposed in the current research is based on taking into account the particularities of nursery agroecosystems materialized in the increased exports of substances and energy with production and the very low degree of their return to the soil with plant residues. As a result, nursery agroecosystems are characterized by an advanced degree of functional instability caused by the disruption of interactions within the organic substance cycle, materialized in the establishment of a specific trophic and metabolic system, which is frequently disrupted by the administration of mineral fertilizers and phytosanitary products, both some and others, causing deep stress states for the soil biota and the ecological system "soil-zoocenosis-pedocenosis-phytocenosis-soil". Therefore, a specific feature of nursery agroecosystems is cumulative abiotization which involves several limiting factors manifested in various forms of soil degradation, materializing in soil fatigue.

The phenomenon of "soil fatigue" came to the attention of research in the second half of the 19th century. Despite multiple research over more than a century and a half, this problem remains acute to this day, and according to the latest calculations, losses caused by soil fatigue account for more than 25% of global losses.

At the same time, to date there is no comprehensive concept of the causes of this phenomenon and its persistence. In our opinion, this is due to the fact that this phenomenon is examined simplistically and unilaterally as a result of some individual factors: the accumulation of phytotoxins, the active development of pests and pathogens, the depletion of nutrient reserves, soil compaction, the reduction of useful water reserves, etc.. With reference to this topic, in our more recent research, "soil fatigue" is examined as one of the most serious forms of soil pathology that limits fertility as a primary factor for the reproduction of the pedogenetic process.

Through the prism of the biophysical approach to soil health and fertility, in the present research, soil fatigue is examined for the first time through the prism of the functionality of the pedofunctional system [bioenergetic system]↔[aggregate system], responsible for the physical, chemical, physicochemical, biological, biochemical states of the soil. Through this prism of ideas, soil health implies physical, chemical, physico-chemical, biological, biochemical states that ensure optimal

conditions for the realization of processes responsible for ecological functions (self-regulation, self-organization, self-purification, environmental-modeling self-reproduction, etc.) and services (crops and their quality, water and air quality, fauna and human health) of the soil. In the same sense, soil fertility implies properties, regimes and processes that ensure physical, chemical, physico-chemical, biological, biochemical states for the optimal realization of ecological functions and services of the soil. Through this prism of ideas, soil health implies physical, chemical, physico-chemical, biological, biochemical states that ensure optimal conditions for the realization of processes responsible for ecological functions (self-regulation, self-organization, self-purification, environmental-modeling self-reproduction, etc.) and services (crops and their quality, water and air quality, fauna and human health) of the soil. In the same sense, soil fertility implies properties, regimes and processes that ensure physical, chemical, physico-chemical, biological, biochemical states for the optimal realization of ecological functions and services of the soil.

Through this prism of ideas, the modernized technology for increasing the resilience of agroecosystems to climate change involves the creation of bioenergetic reserves in soils through complex biolization measures (green fertilizers, intercropping, administration of bioorgano-mineral fertilizer NEOFERT-S) (of local origin obtained within a technology based on the natural model of the humification process) and the management of biological processes in the soil through the administration of the bioorgano-mineral preparation NEOFERT-M (of the same origin).

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Keywords: *tehnologie modernizată, plantații pepeniere, obosirea solului.*

**COMPOSTING OF PLANT RESIDUES ON THE SOIL SURFACE:
APPROACH, ARGUMENTATION, OPPORTUNITIES,
AGROBIOLOGICAL ASPECTS**

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The current phase of evolution of arable chernozems is characterized by the "stagnation" of the chernozem process as a result of the establishment in them of a deficit of organic matter manifested in a low bioenergetic level of interdetermined functioning and interdependence of the pedofunctional system [bioenergetic system]↔[aggregate system] responsible for the reproduction of chernozem typogenetic processes. In this context, through the prism of the biophysical concept of the pedogenetic process, the key element of the agricultural technologies practiced involves the intensification of the mechanisms of self-reproduction of the chernozem process by increasing the perspective bioenergetic resources, being the maximum efficient use of organic matter of plant origin, especially of secondary production, primarily straw. In this context, it is known that in the composition of straw, carbon accounts for more than 80% and calculations have shown that in the case of a harvest of 30 q/ha of cereals with straw in the soil, 3200 kg of organic matter, 14-22 kg N, 3-7 kg P, 22-25 kg K, 9-37 kg Ca, 2-7 kg Mg, 12 g Cu, 160 g Zn, etc. are incorporated. At the same time, the carbon in the composition of straw is contained in the composition of cellulose, hemicellulose, pentosans, lignin, which constitutes a favorable energy substrate for the development of microorganisms but also an important source of carbon for the formation of humus. At the same time, their incorporation into the soil stimulates the active development of soil micro- and mesofauna, increases the activity of earthworms, other living organisms and the activity of nitrogen fixation in the soil. As a result, recently there has been a significant increase in interest in the use of straw as organic fertilizers. At the same time, however, due to the low nitrogen content in them (C:N=80:1) it is necessary to administer 7-10 kg N active substance per 1t of straw together with the straw into the soil, which involves additional expenses. Even in this case, in the first year after incorporating straw into the soil, a state of suppression of the activity of soil biota is observed. Their incorporation without the quantities of nitrogen specified above leads to reduced yields as a result of the disruption of plant nutrition with nitrogen and their decomposition is accompanied by the formation of substances harmful to plants and soil biota. The practices of using them as organic mulch on the soil surface (No-till) involve the majority consumption of the organic substrate to mineralization accompanied by CO₂ emissions and the formation of insignificant amounts of humus and contradict the imperative of carbon neutrality. Through this prism of perspective

ideas are agrobiotechnologies of composting organic waste on the soil surface, this being one of the most accessible and least expensive methods of regularly returning fresh organic matter to the soil.

Unlike the traditional method of straw composting, composting on the soil surface ensures aerobic decomposition of organic matter with the exclusion of the formation of toxic compounds in the soil, as well as the development of pathogenic organisms. In this case, a major part of the products from the decomposition of fresh organic matter is fixed in the soil either by interactions with clay minerals or by reactions with calcium with the formation of calcium humates. This involves the permanent saturation of the soil solution with calcium hydrocarbonate. The incorporation of the organic substrate into the soil in the composting-humification phase leads to the development and unidirectional intensification of the biologization process of the abiotic mineral substrate materialized in the structural-functional modeling that ensures more favorable conditions for the unidirectional development of the humification process, sequestration and stabilization of organic carbon in structural aggregates. For their sustainability, the bioorganomineral fertilizers NEOFERT-S and NEOFERT-M are used, which contribute to the restoration of soil biota and are biological catalysts of the humification process and of the functionality of the soil-plant ecological system. The administration of the NEOFERT-S fertilizer not only complements the nutritional and energy resources of the soil but also contributes to the mobilization of residual phosphorus and potassium accumulated in the soil through the administration of mineral fertilizers. In this sense, superficial composting of straw leads to an increase in the biological activity of the soil both by direct action and by the subsequent effect. The decomposition of flax cloth already in the first year after the administration of the composted mass into the soil constitutes (37-42%) compared to the direct incorporation of straw (23-29%). More receptive to composting technology on the soil surface is the structural-aggregate composition of the soil materialized in the increase in the degree of stability of aggregates > 2 mm. The apparent density decreased compared to the initial state by 0.07-0.1 g/cm³.

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Keywords: *modernized technology, watermelon plantations, composting on the soil surface.*

YIELD OF POTATO VARIETIES DEPENDING ON THE LEVEL OF MINERAL NUTRITION

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The research aimed to establish the optimal level of mineral nutrition and stem density for new potato varieties when grown in the Polissia zone of Ukraine and to determine their effect on yield and seed fraction tuber output. The research results showed that to obtain a high yield of potato tubers on sandy loam soddy-podzolic soils of the Polissia of Ukraine, a combined fertilization system can be recommended, which includes sowing green manure crops, local application of mineral fertilizers in rows during planting, and foliar feeding of potato plants during the sprouting and budding phases with an aqueous solution of Ferticare complex fertilizer, 2 kg/ha. The optimal level of mineral nutrition was established for each studied variety: Skarbnytsia and Fotyniia - $N_{60}P_{60}K_{90}$ + foliar feeding; Zhytnytsia - $N_{75}P_{75}K_{112}$ + foliar feeding.

The research was conducted during 2022–2023 in a four-field technological crop rotation of the Institute for Potato Research on soddy-podzolic sandy loam soils with a plow layer depth of 20–22 cm. The experimental design included seven variants where different methods and rates of mineral fertilizer application were used. Over the two years of research, all varieties responded to fertilizer application with a significant increase in tuber yield. Thus, with local application of mineral fertilizers at planting at a rate of $N_{45}P_{45}K_{70}$, the average yield per variant was: Skarbnytsia – 30.3; Zhytnytsia – 31.5; Fotyniia – 25.2 t/ha, which is 3.4, 3.8, and 2.1 t/ha higher, respectively, compared to the control variant. With local application of $N_{60}P_{60}K_{90}$, the indicators were as follows: Skarbnytsia – 31.7, Zhytnytsia – 33.6, and Fotyniia – 26.3 t/ha; at the highest fertilizer rate of $N_{75}P_{75}K_{112}$, the yield was: Skarbnytsia – 31.7, Zhytnytsia – 34.9, and Fotyniia – 28.1 t/ha. The most effective treatments were those combining basic spring fertilization with foliar feeding. In these variants, all potato varieties showed a yield increase compared to the treatments where only fertilizers were applied.

The results of the conducted research indicate that the effectiveness of fertilizers on the yield of the studied varieties depends on the conditions of the growing year and the biological characteristics of these varieties. Increasing stem density from 200 to 300 thousand stems per hectare led to higher tuber yields across all studied varieties.

Keywords: *yield, foliar feeding, potato, fertilizer*

DYNAMICS OF ROOT ROT DEVELOPMENT IN WINTER BREAD WHEAT PLANTS

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The purpose of the investigations is to study the effect of fertilizers on the intensity of root rot development. All studies were conducted in a stationary, nine-course rotation field at the Department for Plant Production and Cultivar Investigations of the Yuriev Plant Production Institute of the National Academy of Agrarian Sciences of Ukraine (Eastern Forest-Steppe of Ukraine) during 2011–20. The soil was a typical weakly leached, medium-humus, black earth soil. Winter wheat was preceded by black fallow and pea. Winter wheat was grown without the use of insecticides and fungicides. The counts were conducted by sampling from two adjacent rows of 0.5 long metre in three replicates. A block without fertilizers (crop rotation based on natural soil fertility) was compared with an organo-mineral block (applying manure at 6.6 t/ha of crop rotation area or 30 t/ha, and mineral fertilizers at the rate of $N_{30-60}P_{30-60}K_{30-60}$).

The development and spread of root rots (*Helminthosporium* and *Fusarium*) varied during the study. During autumn tillering stage of winter wheat, averaged over 2012–18, for the 2013–19 harvest (except for 2015 for the 2016 harvest), the degree of root rot development against without fertilizers and fertilized backgrounds was 3.4% and 1.9% with spread of 9.4% and 6.1%, respectively. So, a low level of disease was noted. In the future, during spring tillering stage the root rot development significantly increased in block without fertilizers, up to 11.3%, which reached the economic threshold of harmfulness (economic threshold of harmfulness = 10–15%). Against the fertilized background, this index slightly increased up to 4.0%. Spread of root rots was 26.1% and 10.6%, respectively. During wax ripeness stage the development and spread of root rots against both backgrounds were practically at the same level: in unfertilized block 14.0% with spread of 36.3%, against the fertilized background, 15.8% and 39.4%, respectively.

Thus, the use of fertilizers reduced the degree of development and spread of root rots in the initial stages of organogenesis in winter wheat plants. On average over ten years, the use of organo-mineral fertilizers increased grain yield from 5.86 t/ha in the block without fertilizers to 6.47 t/ha or by 10.3%.

Acknowledgments: This study was carried out at the expense of the budget of the Yuriev Plant Production Institute of the National Academy of Agrarian Sciences of Ukraine ("0116U001040" To develop theoretical foundations and ensure reliable protection of field crops from harmful organisms in the conditions of the Eastern Forest-Steppe of Ukraine).

Keywords: fertilizer, winter wheat, root rot.

EVALUATION OF NEW TRITICALE LINES

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One of the promising crops at present is winter triticale - a crop with high potential and nutritional value. The main objective of winter triticale breeding is to increase yield and improve biochemical and technological qualities of grain. The purpose of the research is to identify the breeding significance of new lines for their subsequent use.

The article presents the results of a study of the breeding value of winter triticale lines. The Ingen 93 variety was used as a standard. Four winter triticale lines were studied: K4003, K4005, K4007, K4008. Grain yield, regardless of the direction of its use, is the main feature reflecting the economic value of the lines. The yield ranged from 4.55 to 6.18 t / ha. The highest grain yield was obtained in the K4005 (6.18 t / ha) and K4007 (5.43 t / ha) lines, the standard - 4.55 t / ha. The yield exceeded the standard by 1.63 t/ha and 0.88 t/ha, respectively. The increase in grain yield in the K4005 and K4007 lines was due to the increase in grain weight per spike, which was 3.4 and 3.0 g, with the corresponding indicator for the standard being 2.6 g. The number of grains per spike varied from 53.4 to 74.3 pcs. The weight of 1000 grains in the studied lines varied from 39.3 to 47.3 g. The K4005 (47.3 g) and K4007 (45.7 g) lines had the highest weight of 1000 grains. The plant height of the triticale lines varied from 99 to 117 cm, while for the standard variety Ingen 93 it was 99 cm. Productive tillering was noted at a level of 2.6 to 3.0 stems per plant. All the studied lines belong to the group of mid-season varieties.

Variability of the main breeding-valuable traits was within 1.1-25.4% (Cv). The lowest variability was observed for plant height (1.1-2.8), the most stable traits were: number of spikelets (5.1-10.5) and spike length (4.1-11.7). The most variable traits were: number of productive stems (17.9-25.4), number of grains (8.07-18.5) and grain weight (11.8-22.4). The values of this coefficient are of great importance as an opportunity to select the genotypes of interest. Based on the results of the studies, the best line K4005 with high productivity and resistance to lodging, disease and pest damage was selected, which was sown in the propagation nursery for further study.

Acknowledgments: *The studies were carried out within the project 20.80009.7007.04 "Biotechnologies and genetic procedures for evaluation, conservation and exploitation of agrobiodiversity"*

Keywords: *triticale, lines, productivity, variability.*

BIOCHEMICAL ASSESSMENT OF SOYBEAN GENOTYPES UNDER 2024 CLIMATIC CONDITIONS

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Adapting soybean to abiotic stress caused by climate change is a strategic priority in agricultural research. At the Institute of Genetics, Physiology and Plant Protection, Moldova State University, methods such as directed hybridization and gamma ray-induced mutagenesis are employed to develop high-performing genotypes with valuable biochemical profiles and stability under adverse conditions.

The 2024 agricultural year was marked by significant thermal fluctuations and pronounced water deficit during the pod formation stage—one of the most sensitive phases of soybean development—creating a relevant context for assessing genotypic stress tolerance. These climatic constraints provided a real-life selection pressure, helping to differentiate genotypes based on their physiological response and yield-related traits.

In this study, eight soybean genotypes were evaluated: Cristaster (gamma mutagenesis) – 41.8% protein, 23.1% oil, 8.6% moisture; Z3M₁₀100 (gamma mutagenesis) – 41.2% protein, 22.7% oil, 8.6% moisture; Z1M₉250 (gamma mutagenesis) – 41.7% protein, 22.2% oil, 8.7% moisture; Genap-54 (hybridization) – 41.4% protein, 22.4% oil, 8.6% moisture; Alina (hybridization) – 42.1% protein, 19.8% oil, 8.9% moisture; Zodiac (hybridization) – 41.1% protein, 22.2% oil, 8.5% moisture; L.4 (hybridization) – 42.5% protein, 21.4% oil, 9.6% moisture; L.86 (hybridization) – 42.8% protein, 20.5% oil, 9.0% moisture.

Genotypes developed through mutagenesis showed higher oil content, making them suitable for industrial processing, whereas those resulting from hybridization exhibited higher protein levels, with line L.86 reaching a maximum of 42.8%. High protein content is a key trait for food and feed applications, while elevated oil levels increase value in biofuel and vegetable oil industries. Genotypes with lower moisture content (Zodiac, Cristaster, Z3M₁₀100) are considered better adapted to drought and more stable in post-harvest storage.

This study demonstrates that combining mutagenesis and hybridization is effective for developing resilient soybean genotypes with valuable biochemical traits, supporting future breeding under climate stress.

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Keywords: *soybean, selection, hybridization, induced mutagenesis, protein, oil.*

INHERITANCE AND MANIFESTATION OF PRODUCTIVITY AND SEED COLOUR TRAITS IN WINTER RYE

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In recent years, research on the colour of cereal seeds has shown that anthocyanins and polyphenols, as powerful plant antioxidants, can neutralise free radicals, reducing the risk of dangerous diseases associated with oxidative stress.

The development of heterotic varieties and hybrids of winter rye with high and stable yields under different environmental conditions is important for the selection of crossing components with coloured grain (maternal and paternal forms), study of the genetic fund of this crop and selection of their individual lines based on knowledge of genetic control and variability of grain colour of this crop.

Materials and methods of research. The material of our research was simple F₁ and F₂ hybrids of winter rye (1.471 / 1. 44) and (1.471 / 1. 4351 H/4-1-22).

Based on the hybrid combination No. 16/17-743/18, created by the method of selection and self-pollination (inbreeding), a line of winter rye with purple grain and spikelet scales (hereinafter referred to as line 1.471) was developed in 2017-2020.

The line is 1.471, the limit (Lim) of plant height is 100-131 cm, the grain is large, 9.8-13.1 cm, oval (purple pigments are localised in the shell and anthocyanin colouration of the aleurone layer of the grain), the colour has a normal lustre and roughness, which does not scrape off the surface of the grain. The leaf surface is grey in colour and densely covered with a waxy coating; the plant shape is V-shaped or semi-spreading. The weight of 1000 grains is from 36 to 51 g.

To determine the nature of the inheritance of stem length and plant productivity traits in F₁, the degree of phenotypic dominance (hp) was calculated by Griffing. Grouping of the obtained data was carried out according to the classification of Bale and Atkins.

$$hp = 2^{n-1}(F_n - MP)/(HP - MP),$$

where F_n is the arithmetic mean trait in plants of the n th generation hybrid obtained by self-pollination with F₁; MP is the arithmetic mean trait in both parental forms; HP is the value of the trait in the parent with its maximum manifestation. Interpretation of the estimates of the degree of dominance was carried out according to the scale of Beil et At. $hp = 0$ - no dominance; $0 < hp < 1$ - partial, and at $hp = 1$ - complete dominance; $hp > 1$ - heterosis (over dominance); $hp < -1$ - negative heterosis (depression); $-1 < hp < 0$ - partial and $hp = -1$ - complete dominance of the short-stemmed form.

Results. As a result of studying the peculiarities of inheritance of morphological traits in F₁ and F₂ hybrids obtained by crossing purple pigments localised in the kernel shell with lines of normal colour of winter rye kernels, it was found that the seeds of purple colour showed a recessive type of inheritance.

Quantitative parameters of productivity elements in F₁ hybrids, such as the number of productive shoots, number of flowers per ear, number of grains per ear, grain weight per ear, grain weight per plant exceeded the parental average values. High rates of phenotypic dominance indicate the inheritance of these traits by intermediate, partially dominant and superdominant types.

In F₂ hybrids, a dihybrid splitting into forms with colour was observed: normal colour of the grain, colour of the aleurone layer of the grain (intermediate) and pigments localised in the grain shell (purple). The violet colour was recessive in relation to the normal colour in both hybrid combinations, but at the same time showed dominance in relation to the intermediate colour of the grain in the combination of crossing 1.471 / 1.44, and in the hybrid combination 1.471 / 1.4351 H/4-1-22, on the contrary, the colour of the aleurone layer of the grain (intermediate) showed dominant inheritance over the purple one, which may be a consequence of the epistasis effect. Regardless of the genotypes of winter rye lines included in the crosses with normal and coloured grain, both combinations had a monogenic recessive inheritance.

Conclusions. In F₂ hybrids, there was a dihybrid splitting into forms with the colour of: purple pigments localised in the kernel shell (purple), colour of the aleurone layer of the kernel (intermediate) and normal (white), with a quantitative advantage of normal kernel colour. Regardless of the genotypes of winter rye lines included in the combinations of crosses with coloured and normal colour, a monogenic recessive character of inheritance was revealed for the trait of purple seed colour.

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Keywords: *winter rye, genetic analysis, inheritance, seed colour.*

CONSERVATION AND STUDY OF GENETIC DIVERSITY OF LOCAL POTATO VARIETIES SELECTED FROM PEASANT FARMS IN THE REPUBLIC OF MOLDOVA

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Potato plays an important role in ensuring food security of Moldova. At the same time, the analysis of the situation shows that almost all released varieties of this crop have been developed in other European countries. The Catalogue of Plant Varieties for 2024 indicates 60 potato varieties released in the Republic of Moldova, of which 32 are from the Netherlands and 28 from Germany. The loss of local varieties and populations, which are an invaluable reserve of useful genes and the basis for new genotypes, can lead to an irreversible loss of important characteristics such as adaptability to local abiotic and biotic environmental factors. This is especially important when there are regular risks in Moldova associated with drought and extreme temperature increases during the potato cultivation season. The study included samples of local potato populations collected from peasant farms in the Republic of Moldova in 2021-2023. The main source of genetic material for evaluation was 88 forms of *Solanum tuberosum* L. (varieties, populations) obtained as a result of collection expeditions. Ex situ evaluation of collection forms according to the Descriptor was carried out for 22 morphological parameters, 5 phenological and 4 economically valuable traits. According to the phenological characteristics of plant development, the potato collection was divided into 3 categories: early-60.4% (among which there are 2 standard varieties - *Adorato* and *Paroli*), medium maturing 17.7% (among which 4 standard varieties - *Baltic roz*, *Odett*, *Danaris*, *Safia*) and late-21.9%. Of particular interest for further study is a group of 11 local forms with high early maturity. In terms of average yield per bush, 53 were below the standard varieties, 30 were on par with, and 5 showed higher average yield. In terms of average tuber weight 46 forms were at the level of standard varieties and 7 forms were statistically higher in this indicator. Five local forms resistant to dry and wet rot of potato tubers were identified.

Conclusions: An active collection of local potato populations, consisting of 88 accessions collected from peasant farms in different soil and climatic zones of the country, has been established at the Genebank of Moldova in Laboratory for Plant Genetic Resources. High biological diversity of samples of local potato populations was shown for all studied quantitative and qualitative traits.

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Keywords: potato, plant genetic resources, biological diversity.

OPTIMIZATION OF BIOACTIVE COMPOUNDS EXTRACTION FROM ALOE VERA RESIDUES IN GREEN SOLVENTS

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NADES species are mixtures of certain natural compounds with specific properties that can facilitate the extraction of low water-soluble compounds and their use without further processing to develop novel, biocompatible food or biomedical products.

The purpose of this work was to optimize an experimental lab procedure for the isolation of biologically active compounds (polyphenolic compounds and small molecules - flavonoids) from the agricultural residue represented by the epidermis of Aloe vera leaves using ecological solvents (NADES) and techniques (ultrasound-assisted extraction-UAE), in order to obtain valuable ingredients for biomedical and pharmaceutical products.

The methods consisted of: (i) the preparation and characterization of NADES 1 and NADES 2 viscous solutions from solid ingredients of betaine/citric acid and betaine/glycerol, respectively, converted into liquid by incubation at 80 °C and homogenization on a magnetic stirrer; (ii) the extraction of A. vera epidermis powder in NADES, in an ultrasonic bath, at different temperatures and incubation periods; (iii) the extraction of A. vera epidermis powder in 70% ethanol, at room temperature (control); (iv) centrifugation of extracts at 5000g, 20 min. The total phenolic content (TPC) was determined by the Folin-Ciocalteu method and the antioxidant activity by the TEAC, DPPH and FRAP methods. HPLC analysis was performed to identify and quantify the main phenolic compounds.

The analysis of the prepared solvents showed that NADES 1 had lower pH and conductivity values than NADES 2, and the viscosity of NADES 1 was higher, compared to that of NADES 2. Optical and electron microscopy images showed that these natural mixtures were homogeneous without insoluble crystals, and the particles had a spherical shape. The results of TPC analysis of extracts from the epidermis of A. vera leaves in NADES indicated a higher extraction yield in NADES 1 (40.44%) and NADES 2 (43.28%), compared to the traditional method in ethanol (27.13%), in particular at high extraction temperature and period of incubation. In addition, the extract in NADES 2 showed 32% higher antioxidant activity, compared to that in NADES 1. HPLC analysis revealed that extraction in each type of NADES allowed the solubilization of different phenolic compounds.

In conclusion, the ecological process optimized at the lab level for the extraction of bioactive phenolic compounds from A. vera waste allowed the obtaining of different compositions and associated biological properties, recommending their subsequent use in differentiated biomedical applications.

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REACTION OF SAMPLES OF THE SPECIES *CUPHEA LANCEOLATA* AIT. TO THE ACTION OF ABIOTIC STRESS FACTORS

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The purpose of this research is to evaluate the resistance of samples of *Cuphea lanceolata* Ait. - an oleaginous plant of the *Lythraceae* family, to the action of heat and water stress. The cell membrane stability index (CMSI) and membrane damage index (MDI) following exposure of leaf tissue to 48°C (one hour) temperature action were determined by conductometric method. The CMSI values in the experimental sample ranged from 33.9% to 82.0%, while the control had higher values - 80.0 to 93.2%. The MDI ranged from 9.0% to 68.1%. Based on the manifestation of CMSI degree the genotypes included in the study were divided into three groups: First group - samples with CMSI values within the range of 60 - 80% (MDI 02158, MDI 02159, MDI 02160, MDI 02161, MDI 02162, MDI 02162, MDI 02167, MDI 04084, MDI 04085); group II - samples with ISMC level ranging from 40.0 to 60.0% (MDI 02163, MDI 02164, MDI 02165, MDI 02166), and in the third group were included genotypes with low CMSI level - below 40% (MDI 02145; MDI 02147).

Conclusion: The high variability of the evaluated parameter values emphasizes the individuality of the genotype and provides the possibility to select resistant samples that could be included in breeding programs.

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Keywords: *Cuphea*, resistance, cell membran stability, membrane damage index.

SEARCH FOR SOURCES OF RESISTANCE TO MAJOR WHEAT DISEASES AND YIELD INCREASE IN GLOBAL WARMING CONDITIONS

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During the period of global warming, Ukraine has observed a steady trend towards a decrease in annual precipitation. This leads to an increase in the number of aphids and leafhoppers, and therefore the manifestation of various viral diseases. In the current war period in Ukraine, the area sown with winter wheat has decreased due to occupied and mined territories, but it ranks sixth in grain exports to the world market. This is achieved largely due to wheat varieties that are characterized by high resistance to drought and winter hardiness, tolerance to major diseases, and resistance to lodging and grain shedding. Studies of the impact of viral diseases (WSMV, WDV) on the wheat yield and its structure have shown that they significantly reduce the productivity of winter wheat compared to healthy plants. Greater viral disease severity was revealed for Western wheat varieties (Lemi, Pamir and Akter) and older domestic varieties (Poliska-90, Ukrainka Poltavska, Smuglyanka) compared to modern new domestic varieties, which are more adapted to climate change and are also characterized by increased resistance to diseases, in particular viral ones. A significant decrease in wheat yield under the influence of viral diseases has been established. The ambiguous impact of viral diseases on the yield structure of different varieties has been noted. Varieties have been identified that are less affected by viruses and do not lead to a decrease in yield. These varieties are Vilshana, Sonata Poltavska, Karmelyuk, Tashan, Kuyalnyk, Tvorchiska Odeska, Svitanok Mironivskiy, Rozkishna and others. The *Wsm1* resistance gene to WSMV was detected in these varieties. They can be recommended to breeders as sources of resistance to WSMV.

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Keywords: winter wheat, resistance, yield, viral diseases, global warming.

PHYSIOLOGICAL PROPERTIES OF THE RABBITS BODY TO HEAT STRESS

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Heat stress is a severe challenge for the rabbit industry and one of the main problems with a negative impact on the growth, reproduction and quality performance of rabbit products. The current study investigated the effect of low temperature on the physiological indicators of the rabbits body. In the pre-experimental period, the animals were adapted to new maintenance conditions within 30 days, after the book followed the experimental periods I and II within 30 days with the application of low temperatures of a moderate stressogenic intensity 0-3 °C and +6-8 °C. Throughout the experimental period, the animals were monitored through daily clinical examination. The results obtained of the study denote that the body temperature in rabbits in all pre- and experimental periods is within the limits of the physiological norm, which denotes about the maintenance of homeostasis through various mechanisms of regulation. The action of low temperatures influences the excretory metabolic processes that established verified increased levels at the temperature of 0-3 °C in the experimental batches ($p < 0.05$), and at the temperatures of +6-8 °C there were significant changes in the decrease of these processes ($p < 0.05$). The value of these studied parameters varies depending on the vasoconstriction of blood vessels, increased blood circulation to the organs involved in excretion, including increased metabolism by influencing the animal's requirements for drinking water consumption and, implicitly, urination. The low temperatures produced variations in the heart rate of the animals by increasing ($p < 0.05$) to 0-3 °C in both experimental batches, and therefore this process can be perceived as a stressor, and the stress response may include an increase in heart rate, i.e. a reaction of adaptation of the body to hypothermic conditions is triggered. Temperatures of +6-8 °C, on the contrary, decreased ($p < 0.05$) the heart rate of the animals in both experimental groups, compared to those in the control group, but within the limits of the physiological norm which, possibly, was produced by a lower metabolic rate that determined a decrease in the oxygen requirement of the tissues and, respectively, a reduction in the heart rate. Thus, by applying low temperatures to the experimental herd of rabbits, it is possible to maintain the properties of the thermoregulation, cardiovascular and excretion systems at optimal physiological values through the influence of the thermal factor.

Keywords: rabbit, heat stress, physiological metabolism.

PECULIARITIES OF GENOTYPIC VARIABILITY OF PRODUCTIVITY AND GRAIN QUALITY TRAITS IN SPECIALIZED INBRED MAIZE LINES

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Studies have confirmed the existence of differences in the biochemical composition of grain in different subspecies of maize. It is generally accepted that the flint subspecies is higher than the dent one in terms of protein and oil content and, conversely, has a lower starch content. The semident subspecies occupies an intermediate position between the flint and dent subspecies. A similar pattern can be observed in our studies at the Corn Breeding and Seed Production Laboratory of the V.Y. Yuriev of Plant Production Institute of the National Academy of Agrarian Sciences of Ukraine, where the average values of quality traits differ significantly, with slight differences in absolute values, and correspond to the above position.

A number of peculiarities of morphobiological and economic traits were established. It was determined that the most variable traits for all sources of variability are “productivity”, “number of grains per cob”, “weight of 1000 grains”, “oil content”, for which phenotypic and genotypic coefficients of variation were at high and medium levels. The working collection is dominated by mid-early lines (76%) and lines with a semident grain type (67%), which reflects the main directions of breeding work in recent years. In terms of grain productivity, mid-early lines also generally have advantages, but this trait is differentiated by grain type. The most productive are the groups of mid- early flint and mid-early semident lines (99.6 and 92.1 g of grain per plant, respectively) and the group of mid-early dent lines - 84.3 g of grain. The productivity of the other three groups ranged from 78.0 to 80.2 grams of grain. Flint mid- early lines were also characterized by a higher number of grains per cob (508 pcs.), longer length and diameter of the cob (15.5 and 4.2 cm, respectively) and a higher number of rows of grains per cob - 16.7. By weight of 1000 grains, semident mid-early samples were distinguished, although in each group there is significant variability in this trait. Thus, in practical breeding, it should be paid a considerable attention on determining the impact of a range of environmental factors determined by the growing zone on breeding material.

Keywords: *breeding, corn, inbred line, productivity, biochemical composition of grain.*

USE OF INTROGRESSIVE MATERIAL IN WINTER BREAD WHEAT BREEDING

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Long-term breeding of winter bread wheat to increase yield and improve the technological qualities of the grain has led to the use of genetically related varieties in production. This, in turn, has contributed to the rapid spread of diseases with more frequent epiphytotia, as well as the emergence of more aggressive races, which leads to a loss of resistance. Therefore, expanding the genetic diversity of modern varieties is an economically viable and environmentally safe means of combating crop loss and the spread of diseases.

In the laboratory of breeding intensive wheat varieties of the Plant Breeding and Genetics Institute – National Center of Seed and Cultivar Investigation (Ukraine) by the method of distant hybridization with subsequent hybridological analysis, using introgressive material of winter soft wheat with a unique combination of traits and properties. Thus, the result of introgressive hybridization of the original primary introgressive lines and amphiploids with the participation of *T. dicoccum*, *T. militinae*, *T. timopheevii*, *Ae. tauschii* with modern varieties was lines characterized by resistance to powdery mildew, leaf, yellow and stem rust, having certain morphological features of wild relatives.

Genotypes obtained from interspecific crosses, unfortunately, are not always productive, have other negative characteristics. However, through additional crosses and targeted selection, lines have been created that surpass the best standard varieties Zysk and Nasnaga in terms of productivity. A number of lines of soft winter wheat with high resistance to various types of rust and septoria, and increased protein content in the grain have been identified. Some of them are already undergoing the final stage of breeding work with the prospect of being transferred to state variety testing as varieties: Er. 2668/18, Er.1031/19, Er.2193/19, Er.2276/19, Er.1189/20, Er.2501/20, Er.2584/20, Er.1660/21, Er.2412/21, Er.2786/21, Er.1655/21, Er.2022/21, Er.2370/21, Er.2826/21.

Therefore, the obtained results indicate the prospects of introgressive breeding of winter bread wheat.

Keywords: winter bread wheat, introgressive lines, variety, resistance to diseases.

CLIMATE CHANGE AND ITS IMPACT ON THE DEVELOPMENT OF THE COTTON BOLLWORM *HELICOVERPA ARMIGERA* Hbn

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Global climate change has become one of the greatest ecological and economic challenges of the 21st century, with a profound impact on ecosystems and human activities. Rising global temperatures, changes in precipitation patterns, the intensification of extreme weather events, and seasonal variations significantly affect agriculture and biodiversity.

A relevant example in this context is the cotton bollworm *Helicoverpa armigera* Hbn, also known as the fruit borer. This polyphagous pest has a high adaptability to various environments and affects numerous economically important agricultural crops, such as maize, sunflower, tomatoes, and legumes. Due to its ecological plasticity and ability to rapidly develop resistance to insecticides, *H. armigera* is considered one of the most dangerous lepidopteran pests in the world.

In recent decades, rising global temperatures have led to the appearance of more annual generations, an extended activity period of adults, and an increased reproduction rate. Additionally, changes in precipitation patterns affect the pest's survival during egg and larval stages, while extreme weather events such as droughts or torrential rains influence the population dynamics of this pest.

Besides the direct impact on crops, this species poses a major challenge for farmers, as it can quickly develop resistance to repeatedly used insecticides. This highlights the need for integrated pest management strategies, combining biological, chemical, and technological methods to keep *H. armigera* populations below the economic damage threshold.

In this context, the aim of this research is to analyze how climate change affects the development cycle, reproduction, and spread of the pest *H. armigera*. Climatic conditions and pest population dynamics were monitored to better understand the impact of environmental factors on its behavior. The study also aims to offer solutions for the sustainable management of this pest under current climate conditions.

The research was conducted in the experimental fields of the Institute of Genetics, Physiology and Plant Protection (IGFPP) of the Moldova State University (USM) on soybean, sunflower, and maize crops. The study period covered the entire vegetation season, from April to October 2024.

Seasonal monitoring of *H. armigera* included capturing and recording adult specimens using pheromone traps, visual observations, larval identification on different crops, and field excavation to detect the pupal stage. Meteorological data were also collected and analyzed from the official website of the State

Hydrometeorological Service to better understand the effects of climate change on pest development and behavior.

Research conducted throughout the vegetation season revealed significant variability in *H. armigera* populations depending on climatic conditions and the studied crops. Data analysis showed a strong correlation between average annual temperatures, precipitation, and pest activity on different crops (soybean, sunflower, and maize). A significant correlation was observed between higher temperatures and the increased number of adults captured in pheromone traps. On days with average temperatures of around 27–28°C, trap captures were considerably higher compared to days with averages of 24–25°C. These findings suggest that *H. armigera* develops more rapidly and is more active under higher temperature conditions.

The climatic conditions of 2024 led to the first adult flights of *H. armigera* being recorded starting from the second decade of May until the second decade of October, with three generations being observed. Laboratory-controlled conditions demonstrated that the sum of effective temperatures required for completing one ontogenetic cycle of *Helicoverpa armigera* is approximately 380°C, with a duration of about 30 days.

Digital maps showing pest distribution and localization were developed. It was demonstrated that the main factors influencing the spread of infestations are the phenological development phases of the crops and the pest generations. It was established that infestation hotspots are more pronounced starting from the second and third generations of the pest. The development of these generations is closely linked to the late phenological stages of the experimental crops.

Acknowledgments: The research was carried out under Subprogram 011103 "Development of environmentally friendly means of reducing the impact of harmful organisms on agricultural crops against the background of climate change," funded by the Ministry of Education and Research.

Keywords: *Helicoverpa armigera*, Pheromone traps, Generation, Pests, Climate change.

OAT CULTIVARS WITH DIVERSE HUSK COLOURS AS PROSPECTIVE SOURCES OF PHYTOCHEMICALS FOR THE FUNCTIONAL FOOD SECTOR

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Whole grains are regarded as vital components of nutrition due to their health-enhancing attributes. Oats (*Avena sativa* L.) are inherently gluten-free grains appropriate for individuals with coeliac disease, rich in dietary fibre, notably β -glucans, which provide health benefits such as lowering cholesterol levels, diminishing glucose absorption, and reducing plasma insulin levels. Oats are gluten-free grains abundant in dietary fibre, β -glucans, phenolic acids, flavonoids, carotenoids, vitamin E, and phytosterols. They have been utilised in traditional medicine for ages to address hyperacidity, severe pancreatitis, burns, and dermal irritation. This study evaluated the nutritional and phenolic composition of oat flour (OF) and powdered oat husks (OHs) from white, brown, and black hulled oat genotypes, together with the antioxidant properties of their extracts. OF samples exhibited an average protein level of 15.83%, fat content of 6.27%, and β -glucan content of 4.69%, whereas OH samples were abundant in dietary fibre. OHs had a markedly greater average concentration of total phenolic compounds in comparison to OF, demonstrating twice the antioxidant ability. Ferulic acid was the most prevalent compound in all samples, succeeded by *p*-coumaric, isoferulic, vanillic, and syringic acid. OHs exhibited total insoluble-bound phenolic compound levels that were 13 to 25 times greater. These bioactive substances may enhance the pronounced antioxidant properties reported in the extracts. These findings underscore the promise of OF and OHs as significant components in functional meals and nutraceuticals. The substantial nutritional value and the availability of bioactive chemicals indicate that both the primary component—oat grain—and the byproduct—husk—can provide many health advantages, including improved gastrointestinal health, less oxidative stress, and bolstered immunity. Nonetheless, additional study is required to comprehensively clarify the mechanisms driving these effects and to refine the extraction processes and formulation of oat-based products.

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Keywords: oats; chemical composition; phenolic compounds; antioxidant capacity; functional food.

A SUSTAINABLE STRATEGY FOR UTILIZATION OF CORN SILK AS AGRICULTURAL WASTE WITH THE CONSERVATION OF MAIZE BIODIVERSITY—ESTABLISHING A COMPREHENSIVE FRAMEWORK FOR ECOLOGICAL BALANCE AND ECONOMIC SUSTAINABILITY

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Corn silk (CS) (*Stigma maydis*) has been utilized in traditional medicine (TM) globally for generations due to its antioxidant, antidiabetic, diuretic, antibacterial, and anti-inflammatory properties. CS contains polyphenols, polysaccharides, protein, fiber, alkaloids, minerals, and vitamins, which explains these therapeutic benefits. CS, a major corn-processing byproduct, is routinely discarded, wasting valuable bioresources. Using CS to generate functional and health-promoting value-added products would shift agricultural waste toward zero-waste production, saving the environment and growing the agro-economy. Interconnecting a sustainable approach for agricultural waste utilization with the preservation of corn biodiversity is essential for creating a holistic framework that supports both ecological balance and economic viability. By exploring innovative methods for recycling agricultural byproducts, researchers can develop strategies that reduce waste while promoting the conservation of diverse corn varieties, ensuring a resilient agricultural system for future generations.

CS from different corn hybrids will be tested for bioactive compounds (primarily phenolic compounds). The compounds with the highest antioxidant, antibacterial, diuretic, and anti-diabetic properties will be marked, and capsules with health-promoting properties will be created. Our research aims to resolve the problem of a lack of studies regarding the effect of corn silk genotype and maturity stages during harvest on the biochemical composition, extractability of the bioactive components and health-promoting potential of corn silk extracts. Optimizing the extraction process to maximize the yield of active components for the production of dietary supplement capsules with health-promoting properties is crucial for ensuring the cost-effectiveness of the production process. On the other hand, focusing on defining a green extraction protocol is essential for obtaining eco-friendly, sustainable solutions in light of current green transition trends. The project goals are to provide more detailed answers related to the mechanisms of the diuretic, antidiabetic, antimicrobial and antioxidative effects of CS extracts, i.e. to determine which compounds or groups of compounds act separately, synergistically or antagonistically, enabling health-promoting benefits on human health.

Acknowledgments: This study was supported by the Ministry of Science, Technological Development, and Innovation of the Republic of Serbia (Grant No. 451-03-136/2025-03/200040).

Keywords: corn silk, agricultural waste utilization, biodiversity, health benefits.

**DIVERSITY OF RODENTS (MAMMALIA: RODENTIA) FROM
“PĂDUREA DOMNEASCĂ” RESERVE, REPUBLIC OF MOLDOVA**

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The Scientific Reserve “Pădurea Domnească”, located in the northern region of the republic in the Prut river meadow, 130 km northwest of Chisinau, has an area of 6032 ha. The reserve territory represents a complex of different types of natural ecosystems, which favored the development of rich rodent fauna.

The studies were performed in the period 2007-2022 in forest, steppe, meadow, aquatic and marsh ecosystems.

The rodent diversity is high and includes 21 species of rodents from 6 families (Sciuridae, Spalacidae, Gliridae, Muridae, Cricetidae, Castoridae), which represents 87.5% of rodent fauna of the republic: *Sciurus vulgaris*, *Nannospalax leucodon*, *Glis glis*, *Dryomys nitedula*, *Muscardinus avellanarius*, *Rattus norvegicus*, *Mus musculus*, *M. spicilegus*, *Apodemus sylvaticus*, *A. uralensis*, *A. flavicollis*, *A. agrarius*, *Micromys minutus*, *Ondatra zibethicus*, *Arvicola amphibius*, *Cricetus cricetus*, *Clethrionomys glareolus*, *Microtus arvalis*, *M. rossiaemeridionalis*, *M. subterraneus*. In 2023 a new species was registered – *Castor fiber*, which is a new species for the fauna of the republic since 2020, when it was firstly recorded in Lower Prut. Many species were have wide distribution, being registered in most of the ecosystems, such as *Apodemus* sp., *C. glareolus*, synanthropic species, while others have specific habitat preferences: forest species – *S. vulgaris*, dormice, *M. subterraneus*, dry meadow and steppe species – *N. leucodon*, *M. spicilegus*, *M. arvalis*, *C. cricetus* and wet habitat species – *M. minutus*, *O. zibethicus*, *A. amphibius*, *C. fiber*.

3 species are included in the Red Book of the Republic of Moldova (2015), including the common hamster that is protected at international level (IUCN – CR). “Pădurea Domnească” Reserve is particularly important for the conservation of biodiversity, with much lower anthropogenic disturbances than in adjacent territories.

Acknowledgments: The study was performed within the MSU subprogram no. 010701 and within the contract no. 01-23p-096/03-05-2024 financed by National Environmental Fund.

Keywords: rodents, diversity, habitat preference, rare species, “Pădurea Domnească” Reserve.

AGROBIOLOGICAL STUDY OF LETTUCE HYBRIDS (*LACTUCA SATIVA* L.) IN HYDROPONIC CULTURE

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In the context of the modernization of agricultural technologies, in addition to conventional vegetable growing systems, there is an increasing orientation towards alternative production methods, soilless cultivation systems - hydroponics.

The aim of this research was to evaluate the agrobiological performance of several lettuce hybrids grown in a hydroponic system Nutrient Film Technique (NFT). The study included six lettuce hybrids known for their high potential in hydroponic cultivation, all from the Rijk Zwaan breeding portfolio.

Barlach is a red-leaf *Butterhead* type, Sungari is a red-leaf *Crystal* type, Dunand is a dark green *Crystal* type, Rictus is a dark green *Romaine* type, and Exact is a *Frisée* type with deeply incised and curled light green leaves.

The research was conducted in the hydroponic greenhouse of the GreenBioHub complex, within the experimental sector of the Faculty of Agricultural, Forestry and Environmental Sciences. The NFT system used was a recirculating Nutrient Film Technique setup, which includes slightly inclined gullies through which a thin film of nutrient solution continuously flows. For seedling production, lettuce seeds were sown in mineral wool cubes under optimal germination and early growth conditions. After 12 days from sowing, the seedlings had developed three well-formed true leaves and exhibited a robust root system, with roots approximately 3 cm in length visibly emerging from the mineral wool cubes. Transplanting into the NFT system was carried out on March 16, 2024. Plants were harvested manually on April 4, 2024, at the stage of optimal rosette development. The optimal harvest time was determined based on morpho-phenological criteria such as the number of fully developed rosette leaves and the slight overlap of leaves between adjacent plants on the gully. Plants were completely extracted from the system with the root systems preserved intact for further evaluation. Among the studied hybrids, Rictus stood out for its rapid leaf production and leaf size, positioning it as a promising candidate for intensive production. Barlach recorded the highest number of leaves (24), although these were smaller in size. Sungari, Dunand, and Exact demonstrated a balanced ratio between leaf number and size, indicating valuable agronomic potential. The leaf surface area (cm²/plant) ranged from 71.6 cm² in hybrid Bobal to 124.5 cm² in Sungari, the latter showing the most vigorous vegetative development and highest photosynthetic potential. Rictus (111.9 cm²) and Dunand (101.4 cm²) also registered high values, reflecting balanced growth and efficient rosette formation.

Acknowledgments: this study was carried out within the institutional program Development and implementation of good practices for sustainable agriculture and climate resilience (GREEN) no: 020407, subprogram 02.11.01.

Keywords: hydroponic system, hybrid, lettuce, leaves.

MOBILIZATION AND CONSERVATION OF NEW CULTIVARS OF *ELAEAGNUS UMBELLATA* THUNB.

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In recent years, three new cultivars of *Elaeagnus umbellata* Thunb. (Japanese silverberry) — 'Amoroso', 'Fortunella', and 'Sweet 'n' Sour', which were created in Poland, have been introduced and conserved at the "Alexandru Ciubotaru" National Botanical Garden (Institute) (hereinafter NBGI).

The goal of the research was to study of the bioecological characteristics of these three cultivars of *Elaeagnus umbellata* Thunb.

Phenological observations revealed that the plants of the original species mature later, so, they typically begin blooming at 5–6 years of age and fruit at 7–8 years, while the studied cultivars exhibited much earlier development — blooming profusely at three years and fruiting abundantly in their fourth growing season.

The shrubs bloom in April-May depending on the climatic conditions. The fruit is an edible, ellipsoidal drupe with a sweet-sour taste, approximately 1 cm long. Fruit color ranges from various shades of yellowish-red, depending on the cultivar, and the fruits are densely borne on both the current and previous year's shoots. Ripening begins in late August, and the fruits often remain on the branches until October. The new taxa, similar to the species *Elaeagnus umbellata* Thunb., grow vigorously, are resistant to drought and pollution. The flowers are actinomorphic, bisexual, type 4. Significant differences were observed among the cultivars in flower and fruit density per 20 cm of annual shoot, fruit skin (epicarp) color, as well as fruit and seed size, weight, mesocarp yield and fruiting percentage.

Elaeagnus umbellata is valued for its ability to improve poor soils through nitrogen fixation via its roots. When planted near orchards as shelterbelts, these cultivars can enhance the fruit yield of nearby trees by attracting pollinators with their fragrant flowers.

These cultivars are grown as honey, fruit, forest or ornamental shrubs, growing best in sunny locations with well-drained soils, rich in humus, to obtain high productions of organic, high-quality, nutrient-rich fruits, with diverse contents of biologically active compounds.

Acknowledgments: This study was supported by the research subprogram 010101 “Research and ex situ and in situ conservation of plant diversity in the Republic of Moldova”.

Keywords: *Elaeagnus umbellata* Thunb, cultivars, bioecology, conservation.

SUNFLOWER MONOCULTURE IN THE CONTEXT OF CLIMATE CHANGE IN THE SOUTHERN AREA OF THE REPUBLIC OF MOLDOVA

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Sunflower monoculture is currently not new and is practiced in countries such as Russia, Ukraine, and Argentina on a large scale and over considerable areas, generating profits. A wide range of sunflower hybrids from the most famous companies Corteva, Syngenta, LG, Strube... with good genetics, resistance to blackleg, and the possibility of effective weed control allows for the practice of monoculture. There may be debates and opinions will be divided regarding the practice of sunflower monoculture, but the final word will be based on the economic effectiveness of this branch.

Research conducted during 2022-2025 in a repetition of 4 consecutive years on the same land located in the southern area of the Republic of Moldova, Iujnoe village, Cahul district. The location of the experiment was carried out on a plot within the field with a quality score of 71 points, the soil type being clayey-loamy carbonate chernozem. As a repetition, three of the most famous sunflower hybrids on the market were evaluated, which are cultivated using three different technologies, namely: repetition 1 Express technology, hybrid P64LE25, repetition 2 Clearfield technology, hybrid P64LP130 and repetition 3 classic technology, hybrid LG5377. The harvest was determined gravimetrically, where one hundred calatidia were taken diagonally for each variant and repetition, the extracted seeds were weighed and reported to the number of calatidia per hectare, and precision was also ensured by theoretically determining the harvest, namely by enumerating the production elements.

All hybrids are expected to show a drastic yield reduction trend under these conditions. It can be considered possible to practice sunflower monoculture in the southern area of the Republic of Moldova, although the quantitative harvest decreases, the changes in the qualitative side are not considerable. When practicing sunflower monoculture, great attention must be paid to choosing the appropriate hybrid, namely early or mid-early hybrids with small size. It is considered impossible to practice sunflower monoculture in conditions of insufficient moisture on lands with depleted reserves.

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Keywords: *sunflower, monocultura, climate change, hybrid, economic effectiveness.*

YIELDS AND QUALITY OF MAIZE UNDER THE INFLUENCE OF MANAGEMENT PRACTICES

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The yield and quality of maize are influenced by various plant traits, environmental factors, and agricultural practices. This study, conducted between 2022 and 2024 at the NARDI Fundulea experimental field, aimed to assess the impact of sowing dates, plant density, and climatic conditions on maize yield and quality.

The experiment included three sowing dates (April 1, April 15, and May 1), three maize hybrids (Magnus, Mostistea, and Amurg), and three plant densities (50,000, 60,000, and 70,000 plants per hectare).

Annual rainfall varied across the years, and the highest maize yield and quality were achieved with medium plant density and earlier sowing dates, depending on the hybrid used. Early sowing dates were associated with improved quality values, which were also influenced by the climatic conditions.

The results demonstrated that maize yield and quality were significantly impacted by annual conditions, sowing dates, plant density, and hybrid types, along with numerous interactions between these factors.

Keywords: *maize, yields, quality, technological links.*

FOLIAR APPLICATION OF NANOPARTICLES: EFFECTS ON PLANTS AND CONSUMERS

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The presence of metal nanoparticles (NPs) originated from different sources in the atmosphere leads to the deposition of nano dust on various surfaces, polluting the soil, water bodies, plants. The special physical and chemical properties of NPs allow them to be applied as fertilizers, growth enhancers and pesticides. However, long-term use may pose a risk of their accumulation in plants tissues, soil and transfer to consumers through the food chain. The main goal of the research was to evaluate the effects of gold and copper nanoparticles on *Petroselinum crispum* (Mill.) and human health associated with consumption of contaminated plants.

Copper and gold NPs in a concentration range of 1-100 mg/L were applied to the adult plants during 10 days. Both types of NPs were of spherical shape, with the size 1–4 nm for AuNPs, and 20–50 nm for CuNPs, which formed larger aggregates. The content of copper and gold in plant tissue and soil samples was determined using optical emission and atomic absorption spectrometry, biochemical analyses were performed using a T60 Visible Spectrophotometer.

The application of CuNPs and AuNPs resulted in their accumulation in the green parts of parsley and to a lesser extent in roots and soil. Compared to the control, gold content in the root system increased, while of copper decreased significantly. CuNPs dose-dependently reduced both chlorophyll and carotenoid content at all tested concentrations. AuNPs (1 mg/L) showed a stimulating effect, but concentrations >1 mg/L inhibited pigments production.

Despite the fact that the copper and gold content in the edible parts of plants significantly exceeded their values in control plants, the risk of adverse effects on human health was noted only at gold content in leaves higher than 14.91 mg/kg.

Acknowledgments: This study was funded by a grant AYSS JINR (24-401-07).

Keywords: metal nanoparticles, parsley, ICP-OES, AAS, risk assessment.

EVALUATION OF APPLE VARIETIES UNDER INTENSIVE CULTIVATION FOR INDUSTRIALIZATION

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Scope. Maintaining apple orchards for the production of apples for industrialization involves a series of procedures to ensure tree health, fruit quality and an efficient harvest. Among the most important steps are the selection of apple varieties that are suitable for specific acidities and sugars, soil fertilization (fertilization, irrigation), training and pruning of trees, disease and pest control. The aim of this work is to identify highly productive varieties for industrialization and to adapt appropriate cultivation technologies that ensure the production of high quality apples adapted to the requirements of the industry.

Materials and methods. The research is carried out in the south-eastern fruit-growing area, at S.A. Ghermes Agroservice, s. Saiți, r. Causeni. Renet Simirenco, Granny Smith, Florina, Golden Delicious, Golden Delicious, Golden Resistant, Champion, Pinova, Mutsu, Granny Smith, Idared, grafted on M9 rootstock, planted at a distance of 4x1.2 m, which equals 2083 trees/ha. The orchard is supported and irrigated. The pruning of the trees is carried out according to the planned method, the flowers are thinned with urea, treated with less polluting substances and the plantation is managed to obtain fruit for processing.

Results and discussions. For apple industrialization, the studied varieties were analyzed according to their specific properties, such as strength, productivity and fruit quality. Renet Simirenco, has good processing resistance, uniform maturity, and distinctive aromatic qualities. Granny Smith has a tart taste and is highly prized for use in desserts, cider and juices. Golden Delicious is a popular variety with a sweet taste and crisp texture, used for juices and compotes. Florina, has firm, crisp flesh and a sweet-sour taste, very resistant to rapeseed and frost, adapted for intensive cultivation, it is suitable for juices and preserves. Golden Resistant, is resistant to some diseases, ideal for juices, cider and compotes due to its sweetness and juicy pulp, easy to process. Champion, resistant to rapeseed, suitable for processing. Pinova and Mutsu ideal for juices, compotes, and preserves due to its pleasant flavor and firm texture. Idared, used in juices, preserves and cider, due to its balanced flavor and firm texture.

Conclusions: All these varieties are suitable for the apple processing industry because of their firm flesh, pleasant taste and hardness. Varieties such as Granny Smith, Florina, Pinova and Idared are particularly appreciated for juicing and canning, while Mutsu and Golden Resistant are excellent for flavoring and cider.

Keywords: *M. domestica*, variety, industrialization.

EFFICACY OF SOME SULFUR PRODUCTS IN COMBATING POWDERY MILDEW ON GRAPES

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Plant diseases continue to play a major limiting role in agricultural production. The control of plant diseases using classical pesticides raises serious concerns about food safety, environmental quality and pesticide resistance, which have dictated the need for alternative pest management techniques. The main obstacle to the development of viticulture in the Republic of Moldova is the attack of harmful organisms, which, depending on weather conditions and the efficiency of the methods applied, causes a loss of 25-30% of the harvest, and sometimes - total compromise.

The powdery mildew (*Ucinula necator*) is one of the most damaging grapevines diseases in the Republic of Moldova, as it considerably reduces the crops and wine quality. The pathogen attacks all the aerial organs of the plant: leaves, grass shoots, bunches and berries. Crop losses due to this disease can range from 10% to 80%.

The application of the sulfur-based products is one of the ecological methods of combating powdery mildew on grapes. Considering the low level of toxicity and risk for the environment, this group of preparations is of particular interest as biorational fungicides. The purpose of the research was to determine the biological effectiveness of 3.0 and 4.0 l/ha dilutions of sulfur based products, in the climatic conditions of 2024. The experiments were carried out on the Rosfor grapes variety at the Institute of Genetics, Physiology and Plant Protection of Moldova State University and consisted of 6 treatments applied with a portable sprinkler. As a result of the statistical processing of the experimental data, the highest biological efficacy was recorded for the chemical standard Kumulus (sulfur powder) - 92.3%. In the Sulfur variant - 3.0 l/ha, the biological efficacy was the 92.1%, while in the sulfur version - 4.0 l/ha - 89.1%. Analyzing the obtained results, we can conclude that the product based on sulfur - 3.0-4.0 l/ha demonstrated an essential efficacy and can be used in the prevention and combating of powdery mildew on grapes in ecological agriculture system.

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Keywords: *Ucinula necator*, ecological viticulture, sulfur, biological efficacy.

SUMMER PLANKTONIC ALGAE FROM THE COGÂLNIC RIVER BASIN IN THE TERRITORY OF CIMIȘLIA CITY

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The Cogâlnic River has a basin area of 3,910 km² and a length of 243 km, of which about 7 km are on the territory of the city of Cimișlia.

In order to assess the floristic diversity of the Cimișlia city-ecosystem, planktonic algaeflora from the waters of the Cogâlnic River basin was investigated. 9 samples were taken from the water of the right stream of the Cogâlnic River and the Cogâlnic River upstream and downstream of the city of Cimișlia. Methods of collecting and processing samples were carried out according to the unified standards and methods for collecting and processing hydrobiological samples. Qualitative processing of the samples in the laboratory was carried out using an OPTIKA MICROSCOPE ITALY microscope. The species were determined using the current determiners.

As a result of the processing of the samples, species and varieties of algae from the following phyla were identified: *Cyanophyta*, *Bacillariophyta*, *Euglenophyta*, *Chlorophyta*. The most diverse from a floristic point of view are the sectors of the Cogâlnic river located upstream of the city of Cimișlia, near the route (Str. Suveranității) 17 species and the Cogâlnic river upstream of the city 16 species. More frequently encountered were species of *Euglenophyta* (*E. acus* Ehr., *E. polymorpha* Dang., *E. viridis* Ehr., *E. intermedia* (Klebs) Schmitz, *E. vermicularis* Prosch., *Phacus orbicularis* Hubner, *Ph. caudatus* Hubner, *Trachelomonas abrupta* Swir.) and others, and species of *Diatom* algae (*Bacillariopyta*): *Navicula cryptocephala* Kutz., *Stephanodiscus hantzschii* Grun., *St. astraea* (Kutz.) Grun., *Melosira granulata* (Ehr.) Ralfs.

Green algae (*Chlorophyta*) are characterized by a reduced diversity and in the analyzed samples only the species (*Scenedesmus quadricauda* (Turp.) Breb., *Crucigenia quadrata* Morren, *Clostrerium* sp.) were sporadically encountered.

The reduced diversity of planktonic algaeflora in the waters of the Cogâlnic river basin within the limits of the city of Cimișlia is explained by the pronounced anthropogenic impact within the urban ecosystem on the floristic diversity as a whole and of the waters that flow from the territory of the urboecosystem into the water of the Cogâlnic river.

Acknowledgments: This study was supported by the research project 010801 – “Enhancing ecological security and resilience of geo-ecosystems to current environmental changes” from the State Program of Moldova State University.

Keywords: urban ecosystem, anthropogenic impact, river, algaeflora

FREQUENCY OF HERBACEOUS PLANT SPECIES WITHIN BĂLȚI URBAN ECOSYSTEM

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Bălți urban ecosystem, is located in the Steppe Plain of the Lower Cubolta, which is part of the Steppe Bălți District (VII). Previous studies indicate that it's flora obviously differs from the typical spontaneous zonal flora of the steppes.

In Bălți urban ecosystem, research was conducted in 13 stations during the vegetation period using the linear transect method.

The purpose of the research was to assess biocenosis indices, such as the frequency and constancy of herbaceous plant species, in order to determine which species have greater plasticity and capacity to adapt to the conditions of the urboecosystem. *Species frequency* represents the ratio, between the number of sites where the species is recorded and the total number of sites analyzed. To assess the frequency of the species, there were sufficient qualitative data on its presence or absence in the resort. *Species constancy* represents an indicator that is assessed through the values of the frequency.

Depending on the frequency range, herbaceous species within Bălți urban ecosystem were classified into the following categories: **Euconstant** – with frequency values of 75 - 100% – 16 species, (11%). The most frequently encountered are the ruderal and segetal – ruderal species (*Bromus arvensis* L., *Polygonum aviculare* L., *Chenopodium album* L., etc.); **Constant** – whose frequency values of 50 - 75% – 12 species, (8%). The following species were included in this category: *Cychorium intybus* L., *Ambrosia artemisiifolia* L., etc.; **Accessories** – species with frequency of 25 - 50%, known as companions of the urbanization process. Were reported 37 species (25%): spontaneous (*Trifolium fragiferum* L., *Butomus umbellatus* L., etc.) and ruderal (*Caucalis platycarpus* L., *Plantago lanceolata* L., etc.); **Accidental species** – with frequency of 0 - 25% – are often species that accidentally ended up on the territory of the city were recorded. This category includes 85 accidental species (56%): segetal-ruderal, ruderal, and spontaneous species (*Ajuga genevensis* L., *Salvia nemorosa* L., *Urtica dioica* L., etc.), the latter being at an advantage.

Acknowledgments: This study was supported by the institutional project (010801 (2024-2027): Increasing ecological security and resilience of geo-ecosystems to current environmental changes), funded by (State command).

Keywords: Bălți urban ecosystem, frequency, herbaceous species, segetal-ruderal, ruderal.

SEASONAL INFLUENCE OF PHYSICO-CHEMICAL PARAMETERS ON THE PHYTOPLANKTON COMMUNITY IN THE WATER OF THE RĂUT RIVER, BĂLȚI URBAN ECOSYSTEM, REPUBLIC OF MOLDOVA

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The structure of the phytoplankton community, its composition and species diversity in the aquatic ecosystem are determined by the temporal and spatial variations of physical and chemical factors. The influence of these factors on the phytoplankton community modifies the species composition and diversity in the aquatic ecosystem, ultimately indicating the water quality. In turn, phytoplankton plays a key role in mitigating climate change and global warming, thereby reducing global CO₂ levels.

The present study aimed to determine the physicochemical parameters and dominant algal phyla in the Răut River, the largest and most important watercourse crossing the urban ecosystem of Bălți, Republic of Moldova. Quarterly, during 2022, water and phytoplankton samples were taken from 4 locations located along the river, in different sectors of the city, taking into account anthropogenic activities in the study area. Water samples were analyzed for 11 physicochemical parameters (pH, mineralization, chemical oxygen demand, biochemical oxygen demand, suspended solids, ammonia nitrogen, nitrite nitrogen, nitrate nitrogen, total phosphorus, chlorides, total hardness), along with identification of algae species, using standard methodology. The correlation between planktonic algal flora and water physico-chemistry was evaluated using the Pearson correlation test in the Excel operating program.

Spatial variability existed both in the number of algal species and in the values of physicochemical parameters, with clear differences between sampling sites. In turn, the concentrations of physicochemical parameters deviated from the natural background of water quality, especially at S2, S3, S4. The planktonic algal flora was represented by 68 species from 4 phyla: Cyanophyta, Chlorophyta, Bacillariophyta and Euglenophyta. The dominant complex was represented by Chlorophyta and Bacillariophyta (74%). Therefore, strong and moderate correlations were recorded between the measured quality parameters. Negative correlations dominate in the present study, therefore algal diversity is closely related to physical and chemical factors of the water, such as pH, mineralization, chemical oxygen demand, biochemical oxygen demand, suspended solids, nitrates and total phosphorus. Phytoplankton diversity is highly dynamic, depending on nutrient availability, which is clearly explained by the correlation analysis in the present study. However, this study represents the first attempt in the Republic of Moldova to demonstrate the correlations between planktonic algal diversity and physicochemical parameters in an urban river with pronounced anthropogenic pressures.

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Keywords: water body, water quality parameter, phytoplankton, correlation.

DEVELOPMENT OF POTATO VARIETIES RESISTANT TO QUARANTINE ORGANISMS

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Quarantine organisms that affect potato pose a threat to yield, product quality, and food security of Ukraine. The aim of breeding work is to develop potato varieties with complex resistance to quarantine diseases and pests through conventional breeding methods. The subject of the research is potato varieties developed during 2014-2024 in the potato breeding laboratory of the Polissia Research Department of the Institute for Potato Research of the National Academy of Agrarian Sciences of Ukraine. Currently, the varieties evaluated within the analysis results have undergone state variety testing and have been included in the State Register of Plant Varieties suitable for dissemination in Ukraine. Some of them are patented but not included in the State Register based on the results of variety testing. All studied potato varieties showed resistance to the common pathotype of wart disease (*Synchytrium endobioticum*). Some of them also demonstrate resistance to aggressive pathotypes: to one pathotype – Dzhavelina, Synhaivka; to two – Ivankivska rannia, Oleksandryt, Avanhard, Bazhana, Opillia, Predslava, Vyhoda, Radomysl, Fanatka; to three – Bazaliia, Alians, Vzirets, Sontsedar; to four – Svitana. Resistance to the golden potato nematode (*Globodera rostochiensis* (pathotype Ro1)) was found in the varieties: Vzirets, Bazaliia, Opillia, Bazhana, Avanhard, Predslava, Oleksandryt, Fanatka, Rostavytsia. In Ukraine, bacterial ring rot and stem nematode are included in the list of regulated non-quarantine harmful organisms. However, in European Union countries, both organisms are quarantine pests for potato. Given the international context, we are conducting research on the resistance of the developed potato varieties to these quarantine organisms. Varieties Ivankivska rannia, Mezhyrichka 11, Bazaliia, Predslava, Avanhard, Oleksandryt, Sontsedar, Rostavytsia demonstrate moderate resistance to bacterial ring rot (*Clavibacter sepedonicus*). Resistance to stem nematode (*Ditylenchus destructor*) was observed in the following potato varieties: Mezhyrichka 11, Synhaivka, Predslava, Radomysl, Vzirets, Vyhoda, Oleksandryt, Avanhard, Alians, Opillia, Bazhana, Volodarka, Sontsedar, Fanatka, Rostavytsia and Dzhavelina.

Acknowledgments: The research was conducted within the framework of the scientific project No. 0121U108708, “Investigation of Ecological Stability of Initial Breeding Material Based on Main Economically Valuable Traits and Resistance to Abiotic and Biotic Environmental Factors,” funded by the National Academy of Agrarian Sciences of Ukraine.

Keywords: potato, varieties, resistance, quarantine diseases and pests

THE BIOLOGY OF FLOWERING AND FRUITING IN *BERBERIS THUNBERGII* DC. CULTIVARS

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On the territory of the Republic of Moldova, there are 33 *Berberis* L. species and along with numerous varieties. Over the past six years, 35 barberry cultivars bred in Poland have been mobilized and acclimatized at the “Alexandru Ciubotaru” National Botanical Garden (Institute) of the Moldova State University.

The objectives of the study included the analysis of the peculiarities of flowering and fruiting of four cultivars of *Berberis thunbergii* DC. (*B. th.* ‘Golden Ring’; ‘Powwow’; ‘Rose Glow’; ‘Silver Pillar’), cultivated in the dendrological collection.

All studied plants exhibit some similar traits: hermaphroditic flowers arranged in umbel-shaped inflorescences, ovoid berries, ellipsoidal seeds, and entomophilous (insect) pollination. Flowering is long-lasting and progresses from the apex to the base of the previous year's shoot. The plants start flowering in the third year of vegetation.

The cultivars differ in several morphological features, including flower density per 20 cm of shoot, the number of flowers per inflorescence, petal striation, as well as the size and coloration of fruits and seeds.

Blooming typically occurs from mid-April to early May, depending on climatic conditions. Among the earliest bloomers are ‘Powwow’ and ‘Rose Glow’, which begin flowering around April 20. Flowering abundance is closely linked to weather conditions from the previous year (July-August), when floral bud ontomorphogenesis begins. Full physiological maturation occurs in October-November.

A correlation was observed between leaf coloration and fruit pigmentation, even in early developmental stages. Cultivars with red leaves, such as ‘Rose Glow’ and ‘Golden Ring’, also produce red fruits from the earliest stages, while cultivars with green leaves develop green fruits. This visible association between the colour of vegetative plant organs and fruit coloration can constitute a useful criterion in the selection of varieties with early-season ornamental value.

Acknowledgments: This study was supported by the research subprogram 010101 “Research and ex situ and in situ conservation of plant diversity in the Republic of Moldova”.

Keywords: *Berberis thunbergii* DC., cultivars, flowering, fruiting.

NASTIA - A NEW VARIETY OF WINTER DURUM WHEAT FOR MOLDOVAN AGRICULTURE

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The risk to the population's food security in recent years has become more acute at the global level. The main causes of this phenomenon are increasingly severe and frequent environmental imbalances, including in the Republic of Moldova, and the narrowing of the genetic base of newly created varieties, which increases their vulnerability to unfavorable biotic and abiotic factors. Therefore, the goal of breeders is to create new varieties with high resistance to environmental conditions and high productivity. Currently, the Hordeiforme 333, 335, 340, Auriu 2, 273, Sofidurum varieties are approved in the Republic of Moldova, and the NASTIA variety is being tested at the CTSP.

This variety was created by the method of intraspecific hybridization and selection of elite plants from the hybrid combination Hordeiforme 333/Corall odesskii. The variety is part of the hordeiforme variety (red spike and awns, golden grain). Average size spike 7.9 cm, cylindrical, with an average density of 26.1 spikelets per 10 cm of spike rachis. Medium - sized variety, with plant height of 84.3 cm, twinning degree of 3.6 stems per plant. The number of grains per spike is on average 54.4. The mass of 1000 grains is 42-43 gr. The total protein content is 17.2% and crude gluten 40%. By quality it is attributed to the precious varieties grain. It has resistance to drought, frost and diseases (brown rust, yellow rust, powdery mildew and septoria). The vegetation period is 255-260 days and it is part of the group of plants with medium precocity. The variety is productive and shows a potential productivity of 8.0 t/ha. Which is 1.0 t/ha more than the control variety (Sofidurum). Sowing is carried out in the first decade of October with a sowing rate of 5 million grains per hectare.

The variety is characterized by high glassiness and a special quality of grains with a high protein content, being intended for the production of special flours necessary in the bakery industry, for obtaining high-quality pasta.

Acknowledgments: *The studies were carried out within the project 20.80009.7007.04 "Biotechnologies and genetic procedures for evaluation, conservation and exploitation of agrobiodiversity".*

Keywords: *durum wheat, resistance, variety, proteins, gluten, grains, drought.*

CHANGES IN THE TOTAL COMPOSITION OF PROTEINS IN SUNFLOWER SEEDLINGS UNDER THE INFLUENCE OF DROUGHT

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The aim of the study was to investigate the total protein composition in seedlings of 6 sunflower genotypes subjected to water stress. Three lines with cytoplasmic androsterility (ASC1-ASC3) and three androfertile lines with restored fertility (Rf1-Rf3) were selected for analysis. To create a drought effect, a PEG (6000) solution was used at a concentration of 20% and 30%. Experimental samples at the stage of the appearance of the first pair of true leaves were treated with PEG for 3 and 6 days. Some of the plants were rehydrated after 3 days of PEG treatment, while the drying process was continued for other samples. Total protein was extracted with 0.1M Tris-HCl buffer pH 8.0. After centrifugation and TCA precipitation, the total protein was analyzed by SDS-electrophoresis according to Laemmli (separating gel - 12.5% AA, concentrating gel - 4%).

Electrophoretic analysis showed that under the influence of drought, only two of the six studied genotypes showed noticeable changes in the total protein composition. In the Rf 2 variety, under the influence of PEG (30%), 2 zones D1 and D3 with molecular masses of 21.6 kD and 19.5 kD accumulate within 6 days. The amount of zone D1 increased by 36%, and zone D2 by 21%. In another sunflower genotype (ASC3), more significant changes in the protein composition occurred. In the process of increasing drought, three zones began to accumulate: D1 (21.6 kD), D2 (20.8 kD) and D3 (19.5 kD). The dynamics of accumulation of these zones indicates that in this genotype already at the first stage of water stress, at 20% PEG for 3 days, there is an increased synthesis of proteins, presumably dehydrins. These proteins probably contribute to higher plant resistance. Further stages of drought intensification lead to even higher accumulation of these zones. In plants with 30% PEG (6 days), the amount of D1, D2 and D3 increased by 4.5, 4.9 and 5 times, respectively. Therefore, the ASC3 genotype is more drought-resistant and can be selected as a promising parental form in crossing. Dehydrins are thought to prevent protein denaturation and coagulation during dehydration and are capable of binding significant amounts of water, preventing its loss. In addition, a link has been found between dehydrin levels and plant tolerance to water deficit.

Acknowledgments: This study was supported by the research project 011101 Genetic and biotechnological approaches to agroecosystem management under climate change, funded by Ministry of Education and Research.

Keywords: drought, genotype, sunflower, resistance.

INFLUENCE OF CROWN SHAPE ON THE GROWTH AND FRUITING OF NEW CHERRY VARIETIES UNDER THE CONDITIONS OF THE REPUBLIC OF MOLDOVA

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Scope. Growing has evolved rapidly in the last two decades due to new selections of vegetative rootstocks and self-fertile varieties with superior fruit quality but also to more efficient methods of training, pruning and maintenance of trees and not least new methods of post-harvest handling and storage. Currently the crown forms of fruit trees are diverse and are a function of climatic zone, variety, pruning and maintenance method, planting distance, maintenance objective and crop management. The aim of this work was to increase the productivity of cherry plantations by identifying the crown shape and technological procedures to maintain a physiological balance between growth and fruiting of new cherry varieties grafted on the Gisela 6

Materials and methods. This research evaluated vegetative growth, yield and fruit quality of different cherry varieties using different crown-forming systems and planting densities. The experimental orchards were established in the central (2015) and northern (2018) areas of the Republic of Moldova, using Black Star, Regina, Summit and Sweet Sharetta varieties, grafted on Gisela 6 rootstock. For each variety- rootstock combination and training system, varying densities were established, ranging from 1250 trees/ha (for thin-stem, cup, Kym Green Bush) to 2500 trees/ha (for thin-stem, improved thin-stem, structured vertical axis).

Results and discussions. Black Star, grown under the thin-stem system, obtained the highest yields between 9.39 and 10.92 t/ha at the age of 7-10 years, significantly exceeding the values obtained for the crowns cup (8.11-9.67 t/ha) and Kym Green Bush (7.65-8.22 t/ha). For varieties Regina, Summit and Sweet Sharetta planted at 4x1 m spacing, the improved thin spindle crown shape had a modest impact on productivity, but provided important benefits on fruit size uniformity along the entire length of the axis.

Conclusions. The thin-spindle and ax vertical crown forms were less effective in distributing the fruit evenly on the spindle than the improved form. In conclusion, the improved thin-spindle crown shape is recommended for cherry crops grafted on Gisela 6 rootstock, as it provides an optimal balance between productivity and quality and is a suitable choice for high quality and high yielding crops.

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Keywords: *C. avium*, planting distances, crown forms, yield

PROCESS FOR FORMING CHERRY TREES IN THE SHAPE OF AN IMPROVED SLENDER SPINDLE

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Scope. The crown management system of cherry trees provides a simple crown scheme to produce high yields of quality fruit. Many of the driving systems are complex, require skilled laborers, high cost of production and do not allow renewal of the permanently fruiting semi-islets. The objective of the slender spindle crown formation in cherry is to steer the central axis and preserve the spindle shape, with a crown width at the base of 1.5-2 m and at the tip of 0.8-1.0 m. Trees driven in slender spindle are 3-3.5 m high, and the garland branches are perfectly subordinate to the axis and well lighted.

Materials and methods. Research on the training of cherry trees in the form of improved slender spindle is used in the varieties Kordia and Regina, grafted on Gisela 6, planted in 2018 at a distance of 4x1 m with the rows placed from north to south. Unbranched 2-year-old trees were used for planting and the support and irrigation system was installed.

Results and discussions. The procedure for training improved thin spindle-shaped cherry trees includes pruning the trees in spring in the first year after planting at 100-110 cm from the ground; when the shoot length of 20-30 cm is reached, 5-6 developed lateral shoots are chosen for the formation of the semiskeleton branch zone and one vertical shoot for the central axis, in the second spring the extension branch of the central axis is cut at 100-110 cm above the base of the last semiskeleton branch, when the shoots on the axis reach a length of 3-5 cm, they are weeded at 80-90 cm above the last semiskeleton branch, further on the axis, fruiting and semiskeleton branches are formed, which are periodically substituted. The technical result of the invention is an improvement in the lighting conditions, which ensures an increase in the size and quality of the fruit and the creation of optimum conditions for the care of the trees.

Conclusions. The process of training cherry trees in the shape of a slender spindle is used in an intensive cultivation system. The trees are planted in autumn after leaf fall or in early spring at distances of 3.5-4 m between rows and 1-2 m between trees per row depending on the growth vigor of the variety-tree association. Planting requires the installation of supports and irrigation.

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Keywords: *C. avium*, planting distances, crown forms

INFLUENCE OF TEMPERATURE FACTORS ON THE DEVELOPMENT OF *HALYOMORPHA HALYS* UNDER CONDITIONS OF THE REPUBLIC OF MOLDOVA

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The brown marmorated stink bug *Halyomorpha halys* is an invasive polyphagous species actively spreading across the territory of the Republic of Moldova. Given its high adaptability and wide range of host plants, there is a need to determine the species' reproductive potential in the region's climatic conditions. One of the key tasks was to assess how many generations of the pest can form during the growing season, as well as to calculate the biotemperature characteristics that influence the species' development.

Based on laboratory experiments and the analysis of average daily temperatures, it was determined that the development threshold temperature is 12.27°C. Using the method for calculating the sum of effective temperatures (SET) based on V.V. Yakhontov's (B. B. Яхонтова) formula, it was found that one full generation of the stink bug requires SET = 516°C. In the climatic conditions of Moldova, the total sum of effective temperatures for the season reaches 1625°C, which allows *H. halys* to successfully develop in three full generations.

Field studies revealed a pronounced seasonal population dynamic with a characteristic cumulative effect. Genetic changes in the pest populations occur at each stage of development, leading to gradual adaptation to local conditions. Mutations, natural selection, genetic drift, and recombination contribute to the formation of resistant phenotypes.

Such a number of generations per year increases the threat to agriculture. With each generation, the number of adults increases, which can successfully overwinter and form a powerful spring population. This requires systematic monitoring, the development of predictive models, and an integrated system of control measures based on the pest's phenology.

Thus, *H. halys* poses a serious and dynamic threat to Moldova's agro-ecosystems, demanding immediate attention from plant protection specialists.

Acknowledgments: Research was carried out within the Subprogram 011103 «Development of ecologically harmless means of reducing the impact of harmful organisms of agricultural crops against the background of climate change», financed by the Ministry of Education and Research.

Key words: The sum of effective temperatures, stink bug, *Halyomorpha halys*, generation, seasonal population.

EARLY-STAGE EVALUATION OF COLD STRESS RESPONSE IN PISUM

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In the context of global climate change, it is necessary to adapt both crop composition and cultivation practices. More frequent and intense droughts are shifting sowing dates earlier, exposing seeds to lower temperatures during germination.

To address this, a preliminary study was conducted in 2021 at the Faculty of Biology, V. N. Karazin Kharkiv National University to evaluate cold stress response in pea (*Pisum sativum*). Eight genotypes (Damir 2, Kamelot, Maskara, Efektnyi, Malakhit, Kharkivskiy Yantarnyi, SL 12-20, SL 11-25) from the Legume Breeding Laboratory by Plant Production Institute of NAAS (Kharkiv, Ukraine), were tested using seeds from 2018, 2019, and 2020.

Cold resistance was assessed by germinating seeds on filter paper at +4 °C (control: +20 °C). Root and shoot lengths were measured on days 2, 5, 7, 10, and 12.

All genotypes demonstrated a negative response to cold stress, with no statistically significant differences observed among them. On average, shoot growth was inhibited by 90%, while root growth was reduced by 56%. This uniform response may be attributed to the fact that the studied material consisted primarily of commercial cultivars and breeding lines, which are typically characterized by a high degree of stress adaptation.

However, temporal variation in growth dynamics across the observation periods was statistically significant for both root and shoot parameters. The greatest genotypic divergence was recorded on the 7th day of development. By the 10th and 12th days of the experiment, pea seedlings began to exhibit signs of adaptation to cold stress. This was evidenced by the reduced differences in root and shoot lengths across control and stress conditions. A notable discrepancy was detected in the results obtained from seeds of different years of production. These findings suggest that the use of seeds from single production years may reduce the reliability of cold resistance assessments.

Therefore, we recommend evaluating cold resistance in pea genotypes at a temperature of +4 °C, using seeds from different production years and measuring growth parameters on the 7th day.

Keywords: *Pisum sativum*, abiotic stress, breeding.

DOMESTIC BIODIVERSITY IN ROMANIA FROM AGRARIAN EPOCHS TO THE CONSERVATION OF INDIGENOUS GENETIC RESOURCES

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This study analyzes the evolution of domestic animal biodiversity in Romania from a historical and socio-economic perspective, highlighting the profound influence of agricultural transformations on the native genetic heritage. Six major stages are identified—from the prehistoric pastoral era to the post-communist transition—each marking significant changes in the structure of domestic animal populations and selection strategies. Political, economic, and technological factors have shaped the profile of local breeds, sometimes fostering and other times marginalizing traditional genetic resources. Today, amid the biodiversity crisis and climate change, the conservation of native breeds such as the Romanian Grey Steppe cattle or the Mangalitsa pig gains strategic importance. This paper explores both the decline and the recent revitalization efforts through in situ and ex situ conservation models, integrated into national and European policies. The approach provides a critical understanding of the relationship between agriculture and genetic diversity, emphasizing its role in the sustainability of agro-ecosystems.

Keywords: *animal biodiversity, native breeds, genetic heritage, Romanian agriculture, in situ conservation, ex situ conservation, historical evolution.*

REGULATORY FACTORS OF THE REPRODUCTION PROCESS IN MICROTIN SPECIES

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The reproductive system of rodents is sensitive to variations in climatic, nutritional, protective factors, as well as to the size of the population density and the structure of the community. The high reproductive potential of rodent populations is undermined by abiotic factors or population mechanisms, dependent on density. Insufficient food is the most important factor that reduces the reproduction of species populations. The purpose of the research was to elucidate the factors that influence the reproduction of voles. The investigations were carried out in the central area of the republic. To determine the specific composition and dominance, methods of relative assessment of the numerical population were applied - night traps, route counts. An inversely proportional relationship has been established between the intensity of reproduction of voles and their population density. At the peak phase, in general, the number of reproductive females is reduced, the number and size of offspring, the reproduction period is shortened. It has been established that the influence of various factors on the dynamics of populations of sible species is uneven. The maximum numerical density of the *M.rossiaemeridionalis* species, to a greater extent, depends on the presence of forest curtains and straw bales on the fields. The numerical density of the *M.arvalis* species, which predominantly populates open stations, depends very much on meteorological conditions, as well as on competition with *M.rossiaemeridionalis* individuals. A density of 3-4 colonies per 1 ha of grasses or perennial herbs in early spring is sufficient for 4-5 months in the autumn. Timely harvesting and plowing of the field destroy more than 80% of microtines and only a small share successfully migrates to neighboring fields.

In conclusion, we note that the population size of *M.arvalis* was conditioned by biotic factors, and their strength increases from spring to autumn. In spring, the biotic factors of the current month have a stronger influence on the population, and in autumn - those of the previous month. The same thing should be mentioned for *M.rossiaemeridionalis* individuals, and the difference consists in the smaller influence of abiotic factors of the previous and current month on the population parameters in the following month.

Acknowledgments: The work was carried out within the subprogramme "Evaluation of the structure and functioning of the animal world and aquatic ecosystems under the influence of biotic and abiotic factors in the context of ensuring ecological security and the well-being of the population". Subprogram code: 010701.

Keywords: reproduction, voles, population, fertility.

DIVERSITY OF BIRD SPECIES FROM THE PARK "LA IZVOR" CHIȘINĂU, REPUBLICA MOLDOVA

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"La Izvor" Park is located in the northwestern part of Chisinau city in the Buiucani sector. In the center of the park there is a large lake, formed by a cascade of three ponds connected by channels, on their surface there are several islands. "La Izvor" Park belongs to the category of forest parks, it is located in the peripheral area of the city. The vegetation area is of 163.6 ha, being considered the second largest park in the municipality. The floristic structure includes species of deciduous and coniferous trees and shrubs.

The ornithological study on the diversity of bird communities in the biotopes of the "La Izvor" park was carried out between 2007 and 2024, in the six phenological periods. 84 bird species belonging to 14 orders were registered: s Anseriformes – 2 species, Pelecaniformes - 3, Accipitriformes – 4, Falconiformes – 1, Galliformes – 1, Gruiformes - 2, Charadriiformes – 2, Columbiformes – 3, Strigiformes – 2, Cuculiformes – 1, Apodiformes – 2, Bucerotiformes – 1, Piciformes – 5 and Passeriformes – 54 species. Water birds and waders were represented by *Anas platyrhynchos*, *Aythya ferina*, *Botaurus minutus*, *Nycticorax nycticorax*, *Ardea cinerea*, *Gallinula chloropus*, *Fulica atra*, *Larus cachinnans*, *Chroicocephalus ridibundus*, and the diurnal birds of prey by *Buteo buteo*, *Acipiter gentilis*, *Acipiter nisus*, *Circus aeruginosus*, *Falco subbuteo*. The most diverse are the passerine birds. Among the registered species *Aythya ferina* is listed in the IUCN Red List as vulnerable (VU), *Dendrocopos medius* is included as a vulnerable species in the Red Book of the Republic of Moldova.

Thus, the diversity of bird species in the "La Izvor" park is rather rich, which is due primarily to the variety of habitats, the plant structure specific to forest parks and, last but not least, the general appearance of the landscape which creates favorable living conditions for various bird species belonging to different ecological groups.

The urban parks are of great importance for biodiversity conservation in heavily anthropized areas and the monitoring of urban bird fauna will continue.

Acknowledgments: The study was performed within the MSU subprogram no. 010701 and within the contract no. 01-23p-096/03-05-2024 financed by National Environmental Fund.

Keywords: birds, diversity, phenology, habitat, Parc "La Izvor".

SOIL RESEARCH AT THE ARCHAEOLOGICAL SITE UPPER TRAJAN'S WALL IN THE CIMIȘLIA DISTRICT SECTOR

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Soil research was carried out at the archaeological site of the Upper Trajan's Wall (*Romanian: Valul lui Traian de Sus*), in the Ecaterinovca–Ialpuțeni–Valea Jeparului and Satul Nou sectors (Cimișlia district). The site represents a settlement with remains of habitation from the period of the Goth migration (4th century AD) and from the late Middle Ages (18th century AD), being the only site known to date that overlaps with the linear fortification.

The analysis *methods* used to determine the chemical and physical parameters of the soil were as follows: humus – using the I.V. Tiurin method, modified by V.N. Simakov; granulometric composition – using the pipette method according to N.A. Kacinskii; solid phase density – by the Petinov method; CaCO₃ – by the gas-volumetric method, pH – with a pH meter.

The *results* of the soil analyses from the trench reflect a stratification of the soil profile, with parameters indicating an inversion of the soil from the surface down to a depth of 300 cm, compared to the intact soil profile located on the side of the wall and analyzed as a control profile. When evaluating the parameters of the soil in the trench and of the intact (control) profile, it was found:

The layer at a depth of 0-50 cm has practically the same parameters as the control profile, so, over time, the paedogenetic process has returned to normal due to natural erosion phenomena and anthropogenic levelling.

The layer at a depth of 70-180 cm has physical and chemical parameters that are not appropriate for an intact profile. The density of the solid phase and the humus content are characteristics of the 0-50 cm layer of the typical weakly humiferous chernozem.

The layer at a depth of 180-280 cm originates from the soil of the intact profile at a depth of 70 cm and the base of the trench at 300 cm is a sandy loam.

Conclusion: The soil in the trench is of local origin, coming from the excavation soil, which over time, filled the trench through erosion. The original depth of the trench was 300 cm.

Acknowledgments: This study was supported by the research project 01.15.01 "Prehistoric and Ancient Archaeological Heritage in the Forest-Steppe of the Republic of Moldova: interdisciplinary research and scientific development".

Keywords: soil profiles, archaeological site, Upper Trajan's Wall.

TRADITIONAL APPROACHES FOR PRESERVING AGROBIODIVERSITY IN CROP SYSTEMS

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A modern strategy for improving sustainability in primary agriculture promotes the integration of scientific research and practical implementation. This strategy emphasises the involvement of citizens in various research initiatives and aims to raise community awareness of the importance of conserving natural resources. As society has advanced technologically, modern agriculture has increasingly moved away from natural principles, primarily through hybridisation and the development of new varieties based on a limited genetic pool, which has led to a decline in natural diversity. Citizen science is a fundamental framework that involves community members in research. This includes collecting and monitoring plant species and promoting initiatives such as seed exchanges and establishing seed databases. These efforts ensure that future generations have access to a wide range of information about the region's natural potential. A major challenge in engaging farmers in scientific research and advancing technologies for food production is to effectively mobilise the broader community to address the issues of biodiversity loss and conservation of natural resources. From the perspective of sustainable agriculture, food production systems, whether at the local or global level, promote the sovereignty and development of rural communities. The concept of citizen science is integral to the formulation of new research methodologies that reconcile scientific research with traditional practices in the context of sustainable development. The overarching goal of these initiatives is to increase citizen awareness and initiative for biodiversity conservation. These methods empower local communities and promote the preservation of indigenous knowledge, which is essential for meeting the challenges of our time.

Acknowledgments: *This study was supported by the research project (Contract no. 1377/24, Women Netting for Domestic Seed Treasure Revival - NEST), funded by (The Center for the Promotion of Science, under the auspices of the Ministry of Science, Technological Development and Innovation of the Republic of Serbia).*

Keywords: *indigenous varieties, citizen science, sustainabilit*

ANALYSIS OF ENTOMOLOGICAL COLLECTIONS OF SYRPHIDAE (INSECTA: DIPTERA) IN THE REPUBLIC OF MOLDOVA

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The family *Syrphidae* (Diptera) includes hoverflies, which play an important role in ecosystems as pollinators of plants and natural controllers of pest insect populations. The aim of this study was to analyze entomological collections of representatives from *Syrphidae* family, housed in the Institute of Genetics, Physiology and Plant Protection, MSU. The basis of the work was three boxes of insects stored in the museum with data on genera, species, locations, and dates, as well as information on collectors and identifiers. The entomological material was collected by V. Talitsky, N. Talitskaya, V. Karelin, L. Rogochaya, K.D. Ghorpade and Stackelberg.

The analysis revealed 16 genera, encompassing 35 species, with a total of 315 individuals. The most diverse genera are *Sphaerophoria* and *Eupeodes*, each represented by 5 species, followed by *Syrphus* with 4 species and *Eumerus* with 4 species. Most of the remaining genera are represented by only one or two species, indicating high generic but moderate species-level diversity. In terms of individual abundance, the dominant genera are *Eupeodes* (124 individuals), *Episyrphus* (60 individuals), *Syrphus* (48 individuals), and *Platycheirus* (32 individuals). These four genera account for the vast majority of recorded individuals- approximately 82% of the total. *Episyrphus* is particularly notable, as it is represented by only one species but exhibits very high abundance, indicating its dominance in the sample.

The first individual of *Syrphidae* - *Sphaerophoria menthastri* (Linnaeus, 1758) was collected by V. Talitsky near Chişinău in April 22, 1959. Seasonal activity of the studied insects peaked mainly from May to July, which is associated with the flowering periods of plants on which they feed and reproduce.

Geographically, most of the findings came from the Republic of Moldova, localities Chişinău, Dubăsari and Şerpeni, with a few specimens collected in India (states of Meghalaya and West Bengal). Also, 5 individuals were recorded in Russia (Pskov).

Acknowledgments: The research was supported by subprogram 010701. The authors express their gratitude to the curator of the insect collection and the director of the Institute of Genetics, Physiology and Plant Protection, MSU for permission to work with the collection.

Keywords: *Syrphidae*, hoverflies, pollinators, entomological collections, species, genera.

SPREADING OF THE CABBAGE WHITEFLY IN UKRAINE

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Objective. To determine the spreading of the cabbage whitefly in Ukraine.

Methods. Field surveys and assessment of the phytosanitary condition of Brassicaceae crops for cabbage whitefly infestation.

Results. A widespread dissemination and colonization of Brassicaceae crops by the cabbage whitefly (*Aleyrodes proletella*) has been confirmed across all regions of Ukraine. All cabbage species were found to be infested by this phytophagous insect throughout the growing season.

Conclusions. Mild winters, dry weather, lack of precipitation during the growing season, and the availability of host plants are expected to contribute to further spread and increased harmfulness of the pest. The cabbage whitefly (*Aleyrodes proletella*) is a polyphagous pest that infests and damages crops not only within the Brassicaceae family, including various cabbage species, but also other plants such as winter and spring rapeseed, cucumbers, tomatoes, and weeds like charlock (*Sinapis arvensis*), spurge (*Euphorbia* spp.), greater celandine (*Chelidonium majus*), and shepherd's purse (*Capsella bursa-pastoris*), as confirmed by long-term observations. This pest is relatively new to open-field cultivation, having previously been classified as a significant threat mainly in protected environments (greenhouses). However, over the past five years, it has spread throughout Ukraine. This will be facilitated by climate change, characterized by an increase in average annual temperatures, reduced precipitation during the growing season compared to the climatic norm, successful overwintering in open fields, and the presence of an adequate food base.

According to monitoring data from vegetable farms, the first detections of the pest occurred in 2016 in four regions and in six regions in 2017. By 2024, the phytophagous insect had spread across the entire territory of Ukraine, infesting Brassicaceae crops up to 100% in five regions, up to 15% in three regions, up to 50% in eleven regions, and up to 25% in only one region. From 2016 to 2018, early cabbage crops suffered damage of 7–15%, reaching a maximum of 45–50% of plants, with an average population density of 68 individuals per plant. The infestation of Late cabbage crops was up to 65%.

During 2019–2024, due to warm weather and the absence of rainfall throughout the vegetable growing seasons, the development and harmfulness of the cabbage whitefly intensified, with a significant expansion of its range and crop colonization in all regions of Ukraine. At the beginning of the growing season, infestation of up to 100% was recorded on Chinese cabbage and broccoli, with a population density ranging from 45.5 to 87.5 individuals per plant. Cauliflower was infested up to 75% with an average density of 34.5–45.6 individuals per plant. To a lesser extent, infestation of white and savoy cabbage ranged from 15 to 65%, with densities of 23.5–30.0 individuals per plant. During the summer, cabbage whitefly was also observed on cucumber, pepper, eggplant, and tomato crops, indicating the pest's broad ecological plasticity. The presence of suitable host plants supports the survival of pest populations annually. Average infestation levels of different pepper varieties ranged from 23.5% to 40.5%, cucumbers from 12.5% to 23.3%, and tomatoes and eggplants up to 15.5%, with densities ranging from 5.6 to 25.5 individuals per plant. On tomatoes and eggplants, infestations were significantly lower—from isolated individuals up to 6.6 per plant.

Keywords: cabbage whitefly, spreading, Ukraine, Brassicaceae family

CLIMATE CHANGE AND BIODIVERSITY LOSS: EMERGING RISKS AND INTEGRATED RESPONSES

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Climate change has become a major driver of global biodiversity loss, reshaping ecosystems and disrupting ecological interactions at unprecedented rates. Rising temperatures, altered precipitation patterns, and more frequent extreme weather events are shifting habitat suitability, leading to range contractions, population declines, and local extinctions. These changes also lead to phenological mismatches—such as the decoupling of flowering times and pollinator activity—which disrupt critical ecological relationships. Ocean acidification and warming severely degrade coral reefs, while melting ice threatens polar ecosystems and endemic species.

Vulnerable taxa such as amphibians, reef-building corals, and alpine or Arctic fauna face heightened extinction risks, even under moderate warming scenarios. IPCC projections suggest that at 1.5°C warming, up to 14% of terrestrial species may lose over half of their range—rising to 18% at 2°C. Climate-induced fragmentation, combined with land-use change and overexploitation, exacerbates these pressures. Urgent, integrated strategies are essential, including the protection of climate refugia, enhancement of ecological connectivity, and alignment of mitigation with ecosystem-based adaptation. Biodiversity preservation is not only a conservation imperative, but also a cornerstone of climate resilience, ecosystem stability, and human well-being.

This contribution highlights the need for interdisciplinary approaches that bridge climate science, conservation biology, and policy-making. Through a synthesis of current research and future scenarios, we emphasize the importance of proactive measures and international cooperation. Participants will gain insights into actionable strategies that support both climate goals and biodiversity protection, reinforcing the role of nature-based solutions in addressing global environmental challenges.

Keywords: *climate change, biodiversity, vulnerable species, threatened habitats, ecosystem-based adaptation, ecological connectivity.*

***Denticucullus pygmina* (Haworth, 1809) (LEPIDOPTERA, NOCTUIDAE) – A
NEW GENUS AND SPECIES IN THE FAUNA OF THE REPUBLIC OF
MOLDOVA**

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About 430 species of noctuid moths from Noctuidae family were recorded in the Republic of Moldova, taxonomically belonging to 170 genres and 17 subfamilies: Plusiinae (23 specii), Eustrotiinae (5), Acontiinae (6), Pantheinae (1), Dilobiinae (1), Acronictinae (21), Metoponiinae (5), Cuculliinae (24), Oncocnemidinae (5), Amphipyrrinae (7), Psaphidinae (5), Heliiothinae (11), Condicinae (3), Bryophilinae (10), Xyleninae (143), Hadeninae (84) și Noctuinae (76 specii).

The research was conducted during the vegetation period of 2024 in the Orhei National Park (Orhei district). The entomological material was collected in different habitats of the Orhei National Park, like forests, forest edges, meadows and calcareous canyons from 9 localities on the territory of the Orhei National Park. The moths were collected by installing light traps. The entomological traps with white and ultraviolet light were located at a distance of 15 m from each other. The collection was carried out with a periodicity of two days per week.

As a result of investigation many rare and new specie from Lepidoptera order were indetified for the first time in the Orhei National Park, data to be published later. Among the identified species, has been identified the noctuid species *D. pygmina*, or the small wainscot, from Xyleninae subfamily which represents a new genus and a new species for the fauna of the Republic of Moldova. The species was reported in Ivancea village, Orhei district. Two individuals were collected on 13.09.2024 and one specimen on 16.09.2024 by professor Derjanschi Valeriu by the ultraviolet light trap. So, the number of Xyleninae species identified on the territory of the Republic of Moldova reached 144 and the number of Noctuidae reached 431.

The species *Denticucullus pygmina* is found in most of Europe, ranging from northern Spain, through Portugal as far north as Finland. In the east it is found across the Palearctic to the Russian Far East and western Siberia. It is also found in North Africa, Turkey, the Caucasus region and northern Iran. Adults are on wing from August to October. The larvae feed on *Carex*, *Juncus* and *Iris* species. They feed internally in the stems of their host plant.

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Keywords: new genus, new species, noctuid moths, Xyleninae, Ivancea.

ESTABLISHMENT OF PEG-6000 CONCENTRATION FOR EVALUATING DROUGHT TOLERANCE IN *PHASEOLUS VULGARIS* L.

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In the context of climate change, incorporating non-traditional crops into existing rotations is increasingly important. As a major food legume, common bean (*Phaseolus vulgaris* L.) holds potential for European agriculture but is sensitive to moisture deficiency during germination due to its large seed size. Effective screening of drought tolerance within gene bank accessions is essential. Laboratory assays using PEG-6000 solutions offer a rapid and cost-efficient method for early-stage drought stress evaluation. However, optimal PEG-6000 concentrations must be crop-specific. This study aimed to determine the appropriate concentration for assessing drought tolerance in common bean seeds.

The study was conducted on two bean varieties from the collection of the National Center for Plant Genetic Resources of Ukraine: Holberg (USA), a drought-resistant standard, and Otrada (UKR), a high-yield standard in the eastern Forest-Steppe zone of Ukraine (harvest year: 2024). Seeds were tested under PEG-6000 solution concentrations of 5%, 7.5%, 10%, 15%, and 20%, with distilled water as the control. The experiment was carried out in the Laboratory of Plant Physiology and Biochemistry at the V.Ya. Yuriev Plant Production Institute of NAAS (Kharkiv, Ukraine).

On the seventh day, shoot and root lengths were measured. Osmotic stress led to significant growth inhibition in both bean varieties starting at a 15% PEG-6000 concentration. At 20%, shoot growth was suppressed by an average of 82%. A 5% PEG-6000 solution stimulated root growth in the Holberg variety (130% of control), while even this concentration caused inhibition in Otrada. A 10% PEG-6000 concentration was identified as optimal for distinguishing bean accessions by drought tolerance and will be used in further screening of the collection.

Keywords: *Phaseolus vulgaris*, abiotic stress, drought resistance, genetic resources.

ASSESSMENT OF AIR POLLUTION IN THE VICINITY OF THERMAL POWER PLANTS USING ACTIVE BIOMONITORING

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Moss bags technique using *Sphagnum girgensohnii* was applied to examine potential toxic elements atmospheric deposition around the thermal power plants in Chisinau (Republic of Moldova) and Konakovo (Tver region, Russia). Moss *Sphagnum* was collected in clean area in Tver region. In both locations the moss-bags were exposed during winter period while actively used central heating (November-March). The content of 30 elements in exposed and unexposed moss samples: Na, Mg, Al, Cl, K, Sc, Ca, Ti, Cr, V, Mn, Ni, Co, Fe, Zn, As, Br, Sr, Rb, Mo, Sb, Ba, La, Ce, Hf, W, Th, U, Cu, Cd, Pb, and Hg was determined using neutron activation analysis, ICP-OES and direct mercury analyzer. Significant monthly accumulation of several elements in the exposed moss bags compared to the unexposed one was observed. Content of V, As and Th, tracers of combustion fuel in thermal power plants, increased up from 2 to 4 times. The accumulation level depends on the type of fuel used at the plants.

Keywords: *biomonitoring, moss bags, thermal power plant.*

**NEW RECORDS OF *FORMICA RUFA* LINNAEUS, 1761
(HYMENOPTERA: FORMICIDAE) IN THE REPUBLIC OF MOLDOVA**

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The work includes the results of research conducted in recent years regarding the distribution of this species in the Republic of Moldova. *Formica rufa* Linnaeus, 1761 nests were attested in 2020 in the Feteşti Landscape Reserve, localities Ialoveni, Dănceni, Băcioi, in 2023 nests of this species were identified in the forest ecosystems of the Codrîi and Plaiul Fagului Reserve, along the Chişinău-Leuşeni route near Condriţa and Căpriana, and in 2025 in the localities Vatici, Țigăneşti, Mana and Ivancea from the Orhei National Park.

The red wood ant, or southern wood ant, or horse ant, *Formica rufa*, is a boreal member of the *F. rufa* group of ants, lives in sunny areas at the edge of deciduous and coniferous forests with thick litter. It does not like to be disturbed, therefore urban parks are not preferred by this species. The species *F. rufa* is distinguished from other species by the large body sizes of the queen and males ranging from 9 to 11 mm, and that of the worker ants is 4.5–9 mm. It is widespread in Eurasia. Adult swarms are observed between May and June. This species usually forms large colonies comprising several nests, but colonies in a single nest are also known. *F. rufa* builds its nest in a rotten tree stump, where it gathers spruce needles and small twigs. Sometimes the nests can reach a height of up to three meters.

In March, young queens search for a place to form a new colony, laying up to 100 eggs per day. They often colonize existing nests or establish a new one together with worker ants. There is a distinct division of labor in anthills. The most numerous in the anthill are the worker ants. An ant colony has several fertile females-queens. Large colonies may have 100 000 to 400 000 workers and 100 queens. *F. rufa* is aggressively territorial, and often attacks and removes other ant species from the area. *F. rufa* commonly is used in forestry and often is introduced into an area as a form of pest management due to the high consumption of harmful insects and arachnids in forest ecosystems. Foraging trails of this species may extend 100 m. Larger workers have been observed to forage farther away from the nest. *F. rufa*, like other ant species, plays an important role in natural biocenoses, participating in the spread of myrmecochore plants, such as *Corydalis* sp., because they are attracted by the oily smell of the seeds and carry them to the anthill to feed on them.

In the Republic of Moldova, 65 species of ants are known, of which only the species *Liometopum microcephalum* (Panzer, 1798) is included in the Red Book. Nevertheless *F. rufa* is protected at the international level, being mentioned on the Red List of the International Union for Conservation of Nature, as a species near threatened (NT).

Acknowledgments: The research was carried within subprogram 010701 „Evaluation of the structure and functioning of the animal world and aquatic ecosystems under the influence of biotic and abiotic factors in the context of ensuring ecological security and the well-being of the population”.

Keywords: ants, *Formica rufa*, ecology, distribution, Republic of Moldova

VEGETATION PECULIARITIES OF MINIATURAL DAFFODILS (*NARCISSUS* L.)

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One of the most extensive groups of plants on the globe in terms of the breadth of natural distribution are bulbous and tuberous plants. The most decorative early spring bulbous crops include daffodils, which have not only aesthetic but also ecological significance, creating a favorable microclimate. In this regard, a large role is given to the introduction of daffodils to enrich the cultivated flora with new species.

Daffodil (*Narcissus* L.) is a perennial herbaceous bulbous plant belonging to the Amaryllidaceae family (Amaryllidaceae Jaume), a bulbous geophyte, and an ephemeroid by its life cycle. The genus has about 70 species, and the varietal diversity is more than 12 thousand varieties. In the National Botanical Garden (Institute) "Alexandru Ciubotaru" of the Moldova State University, daffodils are part of the collection of ornamental bulbous plants, where their introduction studies began in 1950, and the collection fund was established in 1978. At the moment, the collection of daffodils is small (16 varieties belonging to 7 groups), and therefore there is a need to replenish it. The aim of our research was to study the biological characteristics of newly introduced species and varieties. The objects of research were 3 varieties of miniature daffodils, belonging to different groups - Hawera (*Triandrus Narcissi* of Garden Origin), Baby Boom (*Jonquilla Narcissi* of Garden Origin) and Tet-a-tet (*Cyclamineus Narcissi* of Garden). The studies were conducted on the experimental plot of the laboratory of ornamental plants using generally accepted methods and the method of Zagorchi, 1990. Throughout the vegetation period, we conducted phenological observations, noted the features of growth and development, adaptive abilities, and recorded biometric indicators. Based on the results obtained, a conclusion was made about the successful adaptation of experimental varieties of daffodils to new conditions, their characteristics were obtained and recommendations for use were given.

Acknowledgments: This study was supported by the research project Subprogramme 010101: Research and conservation of ex situ and in situ plant diversity of the Republic of Moldova.

Keywords: daffodils, vegetation, collection, research, classification, peculiarities, ornamental bulbous plants.

MONITORING OF THE INVASIVE POPULATION OF *HALYOMORPHA HALYS* ON ORNAMENTAL PLANT SPECIES IN THE CONDITIONS OF THE REPUBLIC OF MOLDOVA

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The brown marmorated stink bug *Halyomorpha halys* is an invasive species originating from Southeast Asia. In recent years, it has rapidly spread across Europe, including the territory of the Republic of Moldova. This species is a highly polyphagous pest causing significant damage to agricultural crops, and it also colonizes ornamental plants, deteriorating their appearance and reducing their ecological value.

The objective of this study was to monitor the population of *H. halys* on selected ornamental plant species in urban and suburban areas of Moldova. Fieldwork was conducted throughout the 2024 growing season in four regions: Chişinău, Bălţi, Cahul, and Ştefan Vodă. To estimate the stink bug population, visual inspections of plants were carried out, recording the presence of adults (imago), nymphs, and egg masses. The following ornamental species were surveyed: *Hibiscus syriacus*, *Syringa spp.*, *Ailanthus*, and *Morus nigra*.

The results indicated that the highest adult activity occurred from July to August, with a population peak in early August. Nymphs of all developmental stages were found near aggregations of adults, indicating successful reproduction under urbanized conditions. Visual symptoms of damage included punctures on leaves and fruits, deformities, and premature leaf drop.

Thus, our findings demonstrate that *H. halys* actively colonizes ornamental plants in the Republic of Moldova, underscoring the need to include these species in phytosanitary monitoring systems. The implementation of regular monitoring and involvement of the local population in detecting infestations could significantly improve the effectiveness of control measures against this pest.

Acknowledgments: Research was carried out within the Subprogram 011103 «Development of ecologically harmless means of reducing the impact of harmful organisms of agricultural crops against the background of climate change», financed by the Ministry of Education and Research.

Keywords: *Halyomorpha halys*, ornamental plants, invasive species, monitoring, Moldova.

EVALUATION OF EFFECT OF BIOLOGICAL PROTECTION OF BLUEBERRIES *IN VITRO*

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Often, blueberry farmers face the problem of plant damage by diseases that not only reduce the yield but also worsen its quality. There are about 70 species of fungi that cause significant damage to blueberries. Fungicides are the main means of controlling blueberry diseases. However, studies have shown that some biological control agents and bioactive natural products can serve as an excellent alternative to conventional fungicides.

The aim of the research was to determine the effectiveness of the biological product Cidox against the fungi *Botrytis cinerea*, *Sclerotinia sclerotiorum*, *Alternaria tenuissima* in laboratory conditions.

Methods of investigation. The biofungicide Cidox, which is based on *Bacillus* sp., was chosen for the study. To evaluate the toxicity of the biological product in the laboratory, the method of growing cultures on agar medium with a solution of the product (the 'poisoned medium' method) was used. Concentrations of 0.5% and 1.5% were used, which corresponds to the recommended field rate. Replication – fourfold, each experiment was repeated twice. Three isolates of blueberry pathogens were used: *Sclerotinia sclerotiorum*, *Botrytis cinerea*, *Alternaria tenuissima*.

Results. It was noted that the greatest inhibition of the growth of the *Alternaria tenuissima* colony was observed at a concentration of 1.5%. The highest value of this indicator was observed on the last 15th day and amounted to 48.7 and 60.7% in the variants with concentrations of 0.5% and 1.5%, respectively. Against the grey rot pathogen *Botrytis cinerea*, a high inhibitory effect was observed at a concentration of 1.5%, while there was no significant difference between the control and concentration of 0.5%. At a concentration of 0.5%, there was no inhibition of *Sclerotinia sclerotiorum* colony growth on the second day, and at a concentration of 1.5% it was 42%. The greatest inhibition of pathogen colony growth was observed on the fourth day of recording at a concentration of 1.5% and amounted to 70.1%, while at a concentration of 0.5% there was a decrease in efficiency. It should be noted that in the first days of the experiment, a rather intensive growth of pathogen colonies was observed, but over time it slowed down, and starting from the ninth day, the colonies practically stopped growing.

Conclusion. Studies of the effectiveness of Cidox against fungal pathogens affecting blueberries showed that it inhibits the growth of phytopathogens for a long time. The highest rates of inhibition of colony growth were observed for *Sclerotinia sclerotiorum*.

Acknowledgments: This study was supported by the research project 24.01.02.03.F Scientific bases of management of diseases of fungal etiology in transformed agrocenoses (National Academy of Agrarian Sciences of Ukraine).

Keywords: blueberry, pathogens, biofungicides, growth inhibition.

TESTING THE EFFICACY OF THE PREPARATION CARBERCOL AGAINST CLASTEROSPORIUM (CLASTEROSPORIUM CARPOPHILUM) OF PLUM

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Clasterosporium carpophilum is a disease that occurs in plums in all stages of development, it develops very well in years with high humidity above 60% with a temperature of 18-26 °C. The harmfulness of the disease is manifested by the inhibition of growth and development of the entire plant, premature drying and mass fall of leaves and a decrease in the quantity and quality of the crop. Pesticides are used to combat this disease, which have developed resistance. To prevent this phenomenon, it is necessary to use pesticides with different mechanisms of action and to strictly observe the alternation in their use. The tested object was the biological preparation Carbecol with the active substance potassium bicarbonate, which has a completely different mechanism of action compared to classic specific fungicides.

Materials and methods: The bioecological product Carbecol was applied in a typical testing scheme during the vegetation period with a rate of 4kg/ha. 4 treatments were carried out in the 12-year-old plum plantation in the central area of Nisporeni district on an area of 14 ares. Specialized works served as methodological support.

Results: The application of the Carbecol product in connection with the control in 3 repetitions can validate the expected biological efficacy with a score of over 83.0%, 83.17%, 84.80% and 85.75%. Accordingly, the product has proven performance in the given dosage according to subsequent research.

Conclusions: The biological efficacy of the preparation exceeds the value of 83.0% and demonstrated a lower level of *Clasterosporium carpophilum* intensity, providing an increased value argument.

Acknowledgements: This study was supported by the EcoProt subprogram, 0111013: "Development of environmentally friendly means of reducing the impact of harmful organisms on agricultural crops in the context of climate change", for the period 2024-2027, funded by the Ministry of Education and Research of the Republic of Moldova.

Keywords: product Carbecol, *Clasterosporium carpophilum*, plum, biological efficacy.

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Session B

GREEN CHEMISTRY AND SUSTAINABLE TECHNOLOGIES

SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF ADDUCTS OF (Z)-METHYL 2-(1-(3-CHLOROBUT-2-EN-1-YL)-2-OXOINDOLE AND ACRYLATE IN CONDITIONS OF MBH REACTION

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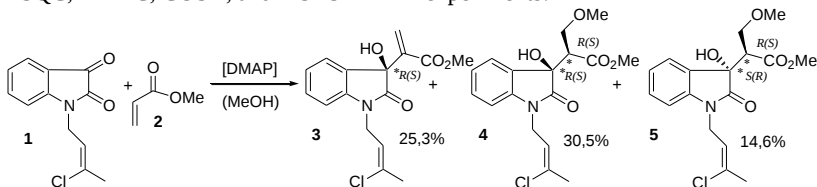
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Isatin is an extremely convenient starting material for the synthesis of various compounds due to the high reactivity of its C-3 carbonyl group, and it has been widely used as a versatile building block in organic synthesis. One of the most popular reactions for obtaining isatin derivatives is the Morita–Baylis–Hillman (MBH) reaction. Compound **3** was obtained in racemic form from N-(3-chlorobut-2-enyl)-functionalized isatin (**1**), which was stirred with methyl acrylate (**2**) in a 1:1.2 molar ratio in methanol in the presence of DMAP for 72 hours, with the addition of a few drops of water. Under these conditions, along with the desired MBH adduct, two additional oil compounds were also formed. After removal of the solvent and separation of the mixture by column chromatography, the isolated compounds were characterized by various physicochemical methods, including IR, ^1H , ^{13}C , DEPT, HSQC, HMBC, COSY, and NOESY NMR experiments.



As a result, the structures of two new, unexpected isatin-derived MBH-type compounds (**4** and **5**) were elucidated. These compounds are diastereomers of each other, formed through the addition of a methanol molecule to the double bond of the MBH adduct (**4**). The nucleophilic addition of methanol to the double bond occurred in an anti-Markovnikov fashion, which can be attributed to the electron-withdrawing effect of the carboxyl group.

Acknowledgments: This study was supported by the research project “Studiul chimic al metaboliilor secundari din sursele naturale locale și valorificarea potențialului lor aplicativ în baza largirii diversității moleculare cu funcționalitate multiplă”, cod: 010601, funded by Moldova State University

Keywords: organic synthesis, isatin, Morita-Baylis-Hillman reaction, isatin-derived MBH.

**SYNTHESIS, SEPARATION AND STRUCTURAL
CHARACTERIZATION OF 1-(3-CHLOROBUT-2-EN-1-
YL)INDOLINE-2,3-DIONE *E/Z*-ISOMERS**

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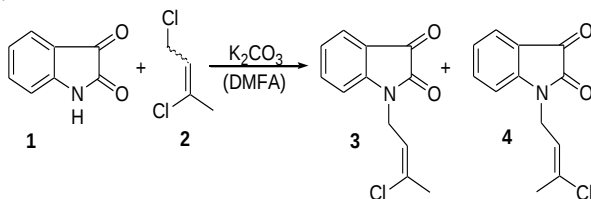
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Izatin is an extremely convenient starting material for synthesis and usually employed as a building block for the synthesis of a wide variety of biologically active compounds, including antitumorals, antivirals, and antituberculars. (*Z*)-*N*-(3-Chlorobut-2-enyl)-functionalised isatin (**3**) is a known compound that is obtained by stirring isatin (**1**) with alkene (**2**) in DMF in the presence of potassium carbonate. The commercially available reagent **2** is a liquid containing two inseparable isomers (*E*- and *Z*-). As a result, the reaction yields two regioisomers, compounds **3** and **4**, in a 2:1 ratio, respectively. Compound **3** is isolated using a standard procedure, by recrystallising the *E/Z* mixture from ethanol. However, the yield is low due to the significant presence of the second isomer. In pharmaceutical production, separating these isomers may be economically unfeasible, and the mixture could potentially be used as a drug substance. However, in the synthesis of bioactive compounds, molecular geometry can critically influence both activity and side effects. Therefore, biological evaluation of both the mixture and individual isomers is required, making their isolation essential. To isolate the second isomer, the filtrate was evaporated, and the residue was separated by column chromatography using petroleum ether as eluent. A large excess of silica gel was needed due to the similar *R_f* values of the components.



Attempts to separate the mixture without removing part of compound **3** were unsuccessful. The structures were confirmed by IR, ¹H, ¹³C, DEPT, HSQC, HMBC, COSY, and NOESY NMR experiments. NOESY data revealed the molecular geometry: the observed spatial interaction between the methyl and vinyl protons in compound **3** confirms the *Z*-configuration, while its absence in the second sample indicates formation of (*E*)-1-(3-chlorobut-2-en-1-yl)indoline-2,3-dione (**4**).

Acknowledgments: This study was supported by the research project with cod: 010601 funded by MEC.

Keywords: organic synthesis, izatin, geometry, NMR, biological activity.

REDOX-CATALYTIC TRANSFORMATION OF PERSISTENT TEXTILE DYES IN SIMULATED NATURAL AQUATIC ENVIRONMENTS

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Wastewater originating from the textile industry represents one of the major sources of aquatic ecosystem pollution, significantly affecting water quality and aquatic life due to the presence of persistent organic dyes. In this context, the present study investigates the chemical transformation processes of textile dyes in natural aquatic systems, treated as redox-catalytic environments. The research focused on elucidating the oxidation mechanisms of Reactive Blue (RB) under conditions simulating natural environments, including the presence of dissolved oxygen, hydrogen peroxide, metal ions (Cu^{2+}), humic substances, ammonium ions, and oxalates.

The experimental methodology involved modeling reactive systems and analyzing the oxidation kinetics using UV-Vis spectrophotometry. The results revealed that under neutral pH conditions ($\text{pH} \approx 7$), the RB dye does not undergo significant oxidation, neither in the presence of O_2 and H_2O_2 , nor with the addition of Cu^{2+} ions, due to the insufficient redox potential of the Cu(II)/Cu(I) couple at this pH. Adjusting the pH to 5.5 led to enhanced catalytic oxidation, demonstrating the critical role of acid-base conditions in the efficiency of redox reactions.

It was found that the reaction rate is directly proportional to the concentrations of the oxidant and the catalyst, and inversely proportional to the dye concentration. The formation of hydroxyl radicals was confirmed via reaction with 4-nitroso-N,N-dimethylaniline, indicating the activation of H_2O_2 during the propagation phase of the reaction.

The influence of natural water ligands on the redox process varied: NH_4^+ ions increased the oxidation rate, $\text{C}_2\text{O}_4^{2-}$ ions significantly inhibited it, while humic substances had no notable effect. These results provide valuable insight into the self-purification potential of natural waters and may support the development of eco-friendly methods for treating textile wastewater.

Acknowledgments: This study was supported by the research project No. 010603, Advanced research in computational and ecological chemistry, identification of technological procedures for treatment, formation of water quality and quantity, funded by NARD.

Keywords: Textile dyes, natural water, catalytic oxidation, hydroxyl radicals, Cu(II) , self-purification, chemical kinetics.

BIOACTIVITY OF 3,4-DIHYDROPYRIMIDINE-2-(TI)S**Chiobanu Natalia, ORCID: 0000-0002-1321-9277****Macaev Fliur*, ORCID: 0000-0002-3094-1990**

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Due to the importance of dihydropyrimidines, several new methodologies have recently been developed for the synthesis of monastrol and its derivatives. The most useful and elegant method currently in use is the multicomponent Biginelli reaction. Catalysis plays a fundamental role in the Biginelli synthesis. Monastrol and oxymonastrol differ from each other by the replacement of the sulfur atom present in monastrol with an oxygen atom in oxymonastrol. The synthesis methods used in these studies are the Biginelli cyclization method. The methods for detecting the final substances are: melting point, thin-layer and column chromatography, spectral methods: NMR, IR.

From the point of view of “green chemistry”, the most waste-free and environmentally friendly, it is of interest to obtain ionic liquids containing various active groups, for example, cyanoethyl, carboxyl, and on their basis to obtain eutectic mixtures and study their catalytic properties in the synthesis of monastrol.

The biological role of monastrol and its derivatives has led to considerable interest in its synthesis and is a three-component one-pot synthesis based on the interaction of acetoacetic ester, thiourea and 3-hydroxybenzaldehyde, which avoids waste from multi-stage purification and the formation of residues while maintaining environmentally friendly conditions. As an antiprotozoal agent, it is used in preparations for the treatment and prevention of infections caused by protozoan parasites belonging to the genus leishmaniasis, affects the activity of urease, etc.

Alkyl-substituted 3,4 dihydropyrimidin-2(1H)-ones (thiones) are extremely attractive substances with various design possibilities: the presence of an alkyl substituent significantly increases the solubility, activity, allows for the targeted action of various compounds and provides a low molecular weight of target compounds. At present, we have obtained specific compounds by condensation of (thio)urea with a number of aliphatic aldehydes and various dicarbonyl compounds in ethyl acetate solution. The reaction proceeds in most cases unambiguously and without the formation of by-products, and optimization of the reaction conditions has allowed us to increase the yields of a number of target compounds up to 88%.

New strategies for creating environmentally friendly catalytic conditions to increase yield, reaction time, selectivity and minimize excess reactants, by-product formation, high temperatures, environmental pollution, waste and cost in Biginelli synthesis were explored for further use in renewable chemicals industry.

Keywords: *Monastrol, oxymonastrol, ionic liquids.*

ECOLOGICAL CATALYSIS OF THE SYNTHESIS OF SOME DIHYDROPYRIMIDINE DERIVATIVES

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In the synthesis of dihydropyrimidines, the goal is to select reagents and test different catalysts and conditions, especially in developing strategies to address environmentally friendly catalytic conditions for further use in the work. Eutectic alloys can serve as an alternative to modern toxic and expensive catalysts for such synthesis. The range of applications of dihydropyrimidinethiones has been expanded by the synthesis of bioactive derivatives of 3,4-dihydropyrimidin-2(thi)one, known as monastrol (ethyl-6-methyl-4-(3-hydroxyphenyl)-2-thioxo-1,2,3,4-tetrahydropyrimidine-5-carboxyl) and oxymonastrol, with the features of replacing the sulfur atom with oxygen, which exhibit a completely new mechanism of anticancer action. The mechanism is based on cell-permeable small molecule inhibition of cancer activity. Monastrol is the result of a three-component one-pot synthesis based on the reaction of acetoacetic ester, thiourea 1b or urea 1a and 3-hydroxybenzaldehyde in the presence of various catalysts. In the synthesis of monastrol, the goal is to select reagents and test various catalysts that are environmentally friendly, least toxic and financially attractive in order to maximize the product yield, reduce reaction time, selectivity and minimize excess reagents, by-product formation, high temperatures, environmental pollution, waste and costs. Catalysis plays a fundamental role in the Biginelli synthesis, especially in the development of strategies to approach environmentally friendly catalytic conditions for further use in the renewable chemical industry. Such catalytic conditions were provided by ionic liquids and eutectic alloys that do not lose their activity in at least five repeated syntheses and ensure environmental protection.

Obtaining oxymonastrol (ethyl-6-methyl-4-(3-hydroxyphenyl)-2-oxo-1,2,3,4-tetrahydropyrimidine-5-carboxyl) under identical conditions is more efficient than obtaining monastrol: the synthesis proceeds faster in time and the yield of the final product is higher. The advantages of the proposed method are: the availability of the reagents used, the simplicity of the synthesis method and purification of the final product, compliance with the theoretical principles of modern ecology, the characteristics of the maximum approach to environmentally friendly catalytic conditions. The production of oxymonastrol under identical conditions is more efficient than the production of monastrol: the synthesis proceeds faster in time and the yield of the final product is higher.

Keywords: 3,4-dihydropyrimidin-2(thi)one, monastrol, oxymonastrol, Biginelli synthesis.

INTENSITY OF PHOTOCHEMICAL TRANSFORMATION OF VITAMIN B₂ IN AQUEOUS SYSTEMS

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Vitamins are complex organic compounds that are necessary for the normal functioning of the body as coenzymes. For this reason, vitamins, including vitamin B₂ (or riboflavin) are produced in large quantities and being water-soluble, it inevitably enters natural waters with wastewater. Proceeding from the above-mentioned it is relevant to study the processes of riboflavin transformation in the aquatic environment and its influence on the ability of water self-purification. Among the chemical processes of self-purification, photolysis plays a major role in the surface layers of natural waters. Thus, the aim of this work is to study the photochemical transformation of vitamin B₂ in the aquatic environment.

A UV lamp model DRT-400 was used as the radiation source. Changes in vitamin concentrations were observed using the direct spectrophotometric method at a wavelength of 445 nm.

In order to investigate whether vitamin B₂ undergoes photochemical transformations in aquatic medium, the following systems were modeled: B₂-H₂O-hv and B₂-H₂O₂-hv. The first system simulates direct photolysis of the substrate, while the second simulates induced photolysis involving hydrogen peroxide, the primary oxidant in natural waters. The kinetic data obtained indicate that vitamin B₂ undergoes both types of photolysis: direct ($k=(1,57\pm0,12)\cdot10^{-4}\text{s}^{-1}$, half-life 1 h. 13 min. 40 s.) and induced ($k=(1,85\pm0,12)\cdot10^{-4}\text{s}^{-1}$, half-life 1 h. 2 min. 22 s.), at $t = 20^{\circ}\text{C}$ and $\text{pH} = 5,80$.

Thus, it was established that in an aquatic environment at $\text{pH}=5.8$, vitamin B₂ undergoes photochemical transformations. However, considering that the rate constant of induced photolysis increased only 1,2 times compared to direct photolysis, it can be concluded that vitamin B₂ is resistant to oxidation. In the event of its entry into natural waters, it will consume a significant number of free radicals, negatively affecting the redox state of the waters.

Acknowledgments: This study was supported by the research project nr. 010603, Advanced research in computational and ecological chemistry, identification of technological procedures for treatment, formation of water quality and quantity, funded by Institute of Chemistry of the Moldova State University.

Keywords: riboflavin, photolysis, water self-purification.

SYNTHESIS AND STRUCTURE OF NEW COORDINATION COMPOUNDS OF Zn(II) AND Cd(II) WITH N-DERIVATED OF PHTHALAZINE

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It is known that zinc and cadmium coordination compounds obtained on the basis of phthalazine are interesting for their luminescent properties. Earlier, we obtained a new aromatic N,N-heterocyclic compound (**L**) (Fig. 1a). Such phenomenon of cyclization is known in the treatment of bis-aryldiazones of *o*-phthalaldehyde with $\text{Pb}(\text{CH}_3\text{COO})_4$. Here we describe the preparation *in situ* of two new complexes of zinc(II) and cadmium(II) with **L**: the reaction of *o*-phthalaldehyde and isoniazid with acetate of zinc(II) or cadmium(II) (1:2:1) yielded a compounds with the composition $\text{ZnL}(\text{CH}_3\text{COO})_2 \cdot 2\text{H}_2\text{O}$ and $\text{CdL}(\text{CH}_3\text{COO})_2 \cdot 3\text{H}_2\text{O}$, respectively. From the filtrate of the last single crystals with the composition $[\text{Cd}(\text{L})_2(\text{CH}_3\text{COO})_2(\text{H}_2\text{O})] \cdot 0.5\text{CH}_3\text{COOH} \cdot 2\text{H}_2\text{O}$ (**1**) were isolated (Fig. 1b).

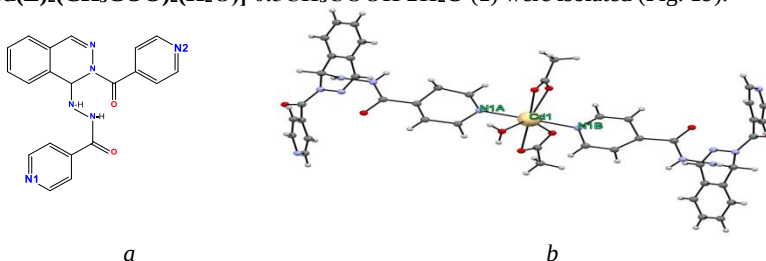


Fig. 1. Chemical diagram of the ligand (**L**) and the complex structure of **1**

The compound **1** crystallizes in non-symmetric triclinic space group $P1$, $a = 8.8175(7) \text{ \AA}$, $b = 10.0066(6) \text{ \AA}$, $c = 15.3550(8) \text{ \AA}$, $\alpha = 87.515(5)^\circ$, $\beta = 85.634(5)^\circ$, $\gamma = 65.023(7)^\circ$, $V = 1224.46 \text{ \AA}^3$; it is a molecular monomer. The coordination polyhedron of Cd(II) is pentagonal bipyramid formed by five atoms of oxygen belonging to two chelate-coordinated acetate ions and one water molecule, and two nitrogen atoms (N1) of the pyridine rings of two neutral ligands (**L**).

Acknowledgments: This study was supported by subprograms **010602** and **011202**, funded by MEC of RM.

Keywords: cadmium(II) complex, isonicotinic hydrazide, *o*-phthalic dicarboxaldehyde.

SYNTHESIS AND CRYSTAL STRUCTURE OF NOVEL COMPLEX OF Co(III) WITH O-PHTHALIC DICARBOXALDEHYDE BIS(ISONICOTINOYL HYDRAZONE)

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Hydrazones are a special class of Schiff bases with the structure $R^1R^2C=NNR^3$, which can be obtained by reaction of carbonyl compounds with hydrazine or its derivatives. Studies of these compounds have shown that they have a wide range of applications in analytical, medicinal chemistry, *etc.* At the same time, they can be used as possible ligands for the synthesis of metal complexes in coordination chemistry.

In this work we report the preparation of novel coordination compound $[Co(L-2H)(Py)_2](ClO_4) \cdot 0.5Py \cdot 1.5H_2O$ (**1**) (here L is new symmetrical organic ligand, $C_{20}H_{16}N_6O_2$) and the study of its structural properties.

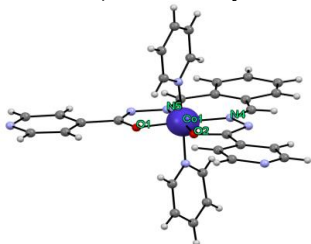


Fig. 1. Molecular structure of $[Co(L-2H)(Py)_2]^+$ in **1**.

deprotonated ligand (L-2H) which is coordinated to Co(III) ions by the N_2O_2 donor atoms. The complex cations and ClO_4^- , Py, H_2O in the outer sphere are connected by fine interactions.

Using a template reaction of o-phthalaldehyde, isoniazid, $Co(ClO_4)_2 \cdot 6H_2O$ in a molar ratio of 1:2:1 with the subsequent addition of pyridine (Py) were obtained orange crystalline product. Single crystal X-ray diffraction study of **1** showed that it crystallizes in monoclinic space group $C2/c$, $a = 22.4931(8)$ Å, $b = 15.5694(8)$ Å, $c = 20.4680(7)$ Å, $\beta = 92.656(4)^\circ$; $V = 7160.3(5)$ Å³, $Z = 8$ (Fig. 1); and that **1** is ionic compound, containing a new tetradentate bi-

Acknowledgments: This study was supported by subprograms **010602** „ Synthesis and studies of new materials based on complex combinations with polyfunctional ligands and having useful application in medicine, biology and technology” and **011202** “Design and production of smart materials with advanced magnetic, adsorption, luminescent and biologically active properties”, funded by MEC of RM.

Keywords: coordination compounds, crystal structure, α -dicarbonylbis(aroylhydrazone).

IMEX 2023-F-9-SC FOR CONTROL OF THE APPLE SCAB ON FRUITS**Curiev Loredana, ORCID: 0000-0002-1927-8358**

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Apple scab, causative agent fungus *Venturia inaequalis*, as well as powdery mildew and fruit rot of apple, caused by fungi *Podosphaera leucotricha* and *Monilia fructigena*, respectively are the most common and significant diseases in apple orchard, especially on varieties susceptible to these pathogens.

Chemical preparation Imex 2023-F-9-SC which contains fluopiram and trifloxistrobin was used in the trials.

The experiments were carried out at the experimental plot of the IGFPP (MSU), on the apple var. Gala during the 2023-year vegetation period. There were 4 variants, 3 repetitions with 3 trees per each repetition.

Table 1. Impact of chemical preparations on the apple scab progress and intensity in the fruits.

Nr.	Variant	Dose, l/ha	Disease progress, %	Disease intensity, %
1	Control (without treatment)	-	33.7	11.9
2	Luna Sensation SC 500 (Etalon)	0,35	5.0	0.9
3	Imex2023-F-9-SC	0,35	6.0	0.7
4	Imex2023-F-9-SC	0,4	5.3	0.7

Fungicide Imex2023-F-9-SC used at the consumption rates of 0.35 and 0.4 l/ha under the climatic conditions of the 2023 year successfully suppressed *Venturia inaequalis* growth on the apple fruits and therefore can be recommended for the apple scab control.

Acknowledgments: This study was supported by the research project within the subprogramme 011103: "Development of environmentally friendly means of reducing the impact of harmful organisms on agricultural crops against the background of climate change" funded by the National Agency for Research and Development.

Keywords: Apple scab, chemical control, Imex2023-F-9-SC, Luna Sensation SC 500, disease intensity, disease progress.

SYNTHESIS AND CHARACTERIZATION OF ZINC TETRANITROPHTHALOCYANINE

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This study reports the synthesis and detailed characterization of tetranitro zinc(II) phthalocyanine ($\text{ZnPc}(\text{NO}_2)_4$). The compound was synthesized via the cyclotetramerization of 4-nitrophthalonitrile with zinc chloride using 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU) as a base, followed by a purification process involving acid and base treatments. The synthesized $\text{ZnPc}(\text{NO}_2)_4$ was thoroughly characterized using a combination of spectroscopic techniques. Fourier Transform Infrared (FT-IR) and Nuclear Magnetic Resonance (NMR) spectroscopy confirmed the successful formation and structural features of the compound. The electronic properties were investigated using Ultraviolet-Visible (UV-Vis) spectroscopy, revealing a characteristic Q-band absorption. The excited-state behavior was further probed using fluorescence and phosphorescence spectroscopy, providing insights into its emissive properties and triplet state population at room temperature. The spectral data obtained provide a comprehensive understanding of the structural and photophysical properties of this functionalized zinc phthalocyanine, highlighting its potential for applications in various fields.

Acknowledgments: This study was supported by the research project "Design of Supramolecular Architectures based on metal phthalocyanine derivatives: functionalized nanoparticles for medicine" #011209, funded by Ministry of Education and Research of the Republic of Moldova.

Keywords: tetranitro zinc phthalocyanine, FTIR Spectroscopy, UV-Vis Spectroscopy, fluorescence, phosphorescence, excited-state properties.

SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF 2-((BUTYLAMINO)(2-HYDROXY-5-NITROPHENYL)METHYL)-3-HYDROXYNAPHTHALENE-1,4-DIONE

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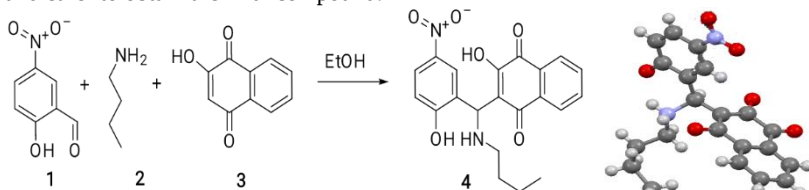
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Naphthoquinones and their derivatives are recognized for their wide-ranging biological activities, including anticancer, antimicrobial, and antioxidant effects. A new naphthoquinone derivative, 2-((butylamino)(2-hydroxy-5-nitrophenyl)methyl)-3-hydroxynaphthalene-1,4-dione, was synthesized through the three component Mannich condensation of 2-hydroxy-5-nitrobenzaldehyde with 2-hydroxy-1,4-naphthoquinone and butylamine. A suspension of 2-hydroxy-1,4-naphthoquinone (1.7 mmol) in 5 ml ethanol and butylamine (1.8 mmol) were stirred at room temperature for 10 minutes (dissolution of the naphthoquinone and a color change was observed), 2-hydroxy-5-nitrobenzaldehyde (2 mmol) was added and the mixture stirred at room temperature for 12 hours. The resulting precipitate was filtered, washed with ethanol and ether to obtain the final compound.



The compound was structurally characterized by IR, UV-Vis, NMR, and mass spectrometry. The IR spectrum indicated the presence of hydroxyl, nitro, and quinonoid groups. UV-Vis spectroscopy revealed characteristic $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transitions. NMR spectra confirmed the structure and symmetry of the molecule, and ESI-MS established the molecular mass. The crystal structure was obtained with XRD. Intramolecular hydrogen bonding likely stabilizes the observed configuration. The spectral properties support its structural assignment, and the molecule's conjugated system suggests possible utility in redox and coordination chemistry.

Acknowledgments: This study was supported by the research project “Studiul chimic al metaboliţilor secundari din sursele naturale locale şi valorificarea potenţialului lor aplicativ în baza lărgirii diversităţii moleculare cu funcţionalitate multiplă”, cod: 010601, funded by Moldova State University.

Keywords: organic synthesis, lawsone, mannich reaction, three component reaction.

CATALYTIC DEGRADATION OF SODIUM DODECYLBENZENESULFONATE: A COMPARATIVE ASSESSMENT OF FENTON AND PHOTO-FENTON OXIDATION

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Advanced oxidation processes (AOPs), such as Fenton and UV/Fenton, are widely recognized as effective methods for the treatment of wastewater containing persistent organic pollutants, including anionic surfactants. This study investigates the catalytic oxidation and mineralization efficiency of sodium dodecylbenzenesulfonate (SDBS), a common anionic surfactant with an aromatic ring and a long aliphatic chain, which exhibits high resistance to biodegradation.

The research focused on evaluating and comparing the performance of Fenton and UV-Fenton processes under controlled experimental conditions. In the UV/Fenton system, the influence of ferrous ion (Fe^{2+}) concentration in the range of $1 \cdot 10^{-5}$ to $1 \cdot 10^{-3}$ M was analyzed at a constant pH of 3.0 and an initial SDBS concentration of 20 mg/L. The degradation mechanism involves the interaction between Fe^{2+} and hydrogen peroxide (H_2O_2), generating hydroxyl radicals and Fe^{3+} ions. The latter are subsequently reduced back to Fe^{2+} , maintaining the catalytic cycle.

Experimental results showed that increasing the Fe^{2+} concentration significantly enhanced the reaction rate and degradation efficiency, with the SDBS removal increasing from 57.8% to 70.2%. Similarly, the effect of varying H_2O_2 concentration ($1 \cdot 10^{-5}$ to $1 \cdot 10^{-3}$ M) was studied, revealing an improvement in degradation efficiency from 53.9% to 70.2%. Comparative experiments under optimal conditions indicated that the UV/Fenton process achieved a considerably higher degradation efficiency (70.2%) compared to the classical Fenton process (40.3%).

These findings confirm that the integration of UV radiation into the classical Fenton process significantly improves the degradation kinetics and overall mineralization efficiency of SDBS. The study provides valuable insights for the design and optimization of advanced treatment technologies for wastewater containing surfactants and other recalcitrant organic pollutants.

Acknowledgments: This study was supported by the research project No. 010603, Advanced research in computational and ecological chemistry, identification of technological procedures for treatment, formation of water quality and quantity, funded by NARD.

Keywords: sodium dodecylbenzenesulfonate, Fenton and Photo-Fenton processes, advanced oxidation processes.

CHEMICAL DEGRADATION OF VITAMIN B₆ IN THE AQUATIC ENVIRONMENT

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Water pollution by organic substances is a pressing global issue that necessitates continuous assessment and investigation. The problem becomes more severe when the self-purification capacity of aquatic systems is significantly reduced in comparison to the influx of pollutants. Therefore, it is important to study the involvement of various pollutants with regenerative properties in the chemical self-purification processes of water bodies. Vitamins, including vitamin B₆, can also be attributed to such substances. Their presence in natural waters may originate from both the metabolic activities of hydrobionts and anthropogenic sources such as waste from the pharmaceutical industry involved in food supplement production, as well as municipal wastewater discharges. The purpose of this study is to investigate the contribution of vitamin B₆ to the self-purification processes of water bodies.

To study the kinetics of vitamin B₆ transformation processes in aqueous solutions, in model systems, a direct spectrophotometric method was employed using a phosphate buffer solution at pH 7.

The obtained results suggest that the presence of vitamin B₆ in the aquatic environment may contribute positively to chemical self-purification processes. Vitamin B₆ undergoes efficient degradation, either by dissolved oxygen in the presence of copper ions. This is beneficial, as it does not require additional reagents or special conditions. Moreover, given its short half-life, the substrate is not persistent and can be easily removed from the aquatic environment. The oxidation of vitamin B₆ by dissolved oxygen results in the formation of an additional amount of hydrogen peroxide. The accumulation of H₂O₂ in water contributes to maintaining the oxidative state of the aquatic system and facilitates its involvement in redox processes with peroxidase substrates. The fact that hydrogen peroxide and Cu(II) ions do not effectively promote faster oxidation of vitamin B₆ has a positive effect on the aquatic environment, as these species remain available to participate in other chemical processes.

Acknowledgements: *The results have been obtained in the framework of the project 010603 – Advanced research in computational and ecological chemistry, identification of technological procedures for treatment, formation of water quality and quantity, funded by NARD.*

Keywords: *vitamin B₆, self-purification, dissolved oxygen, Cu(II) ions.*

STANDARDIZATION OF PROPOLIS AS A RAW MATERIAL OF MEDICAL AND COSMETIC INTEREST

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Propolis is a raw material collected by bees from the buds and leaf axils of certain trees and has a particularly complex composition, having various biological and pharmacological properties, the mechanisms of action of which have been extensively investigated in recent years. Currently there is only the international standard ISO 24381:2023, which regulates the physical and chemical requirements regarding bee propolis and the test methods for each characteristic.

The purpose of this research was to test 8 samples of propolis collected in the Southern, Central and Northern regions of R Moldova, in order to establish whether they correspond to the requirements of the international standard.

The parameters such as loss on drying, ash content, total phenolic compounds (Folin), total flavonoids (AlCl₃) were determined using the approved methods and the chemical composition by gas chromatography coupled with mass spectrometry (GC-MS).

Thus, in the analyzed samples, the moisture content varied in the range (1.4–3.3)%, no sample exceeded the limit of max 10.0%. The ash content varied in the range of (0.5–2.2)%, which also did not exceed the limit of max. 5.0%. The values for total phenolic compounds (Folin) ranged from (10.7–15.0)%, as gallic acid, the requirement being min. 10.0%, and (18.2–25.5)%, as galangin, the requirement being min.17.0%. The values for total flavonoid (AlCl₃) vary between (1.9–3.3)%, as quercetin, 6 samples out of 8 are below the limit of min. 3.0%.

According to GC-MS analyses, the main constituents in the analyzed samples are: *p*-coumaric acid, chrysin, ferulic acid, pinocembrin, etc. which denotes this is brown propolis, therefore all the results obtained were compared with the requirements indicated for brown propolis.

According to the analyzed parameters, only 2 samples out of 8 correspond to all the characteristics and can be used as a raw material, which highlights the importance of standardizing the raw material.

Acknowledgments: *This study was supported by the research project No. 010603, Advanced research in computational and ecological chemistry, identification of technological procedures for treatment, formation of water quality and quantity, funded by NARD.*

Keywords: *propolis, standardization, requirements.*

EFFECT OF NANO ZEROVALENT IRON ON SOIL POLLUTED WITH ORGANOCHLORINE PESTICIDES

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Organochlorine pesticides (OCPs) are persistent pollutants that accumulate in soils, threatening ecosystems and human health. Due to their resistance to degradation, advanced remediation methods are required. Nanoscale zero-valent iron (nZVI) is a promising solution, offering high reactivity for reductive degradation of chlorinated compounds. Combining nZVI with biological enhancers can further improve pollutant removal by stimulating microbial activity. The aim of this study was to evaluate the effectiveness of nZVI and soy extract for the remediation of soil with long-term contamination by OCPs (DDT, HCH, and their metabolites).

Soil samples contaminated with OCPs were collected from an orchard located in the Călăraș district, Republic of Moldova. The experiment was conducted *ex situ* under oxic and cycled anoxic/oxic conditions. Prior to the start of the experiment under anoxic conditions, the soil was amended with a colloidal aqueous solution of nZVI, stabilized with poly-*N*-vinylpyrrolidone (PVP), and supplemented with soy extract. The presence of pesticide residues in the soil was confirmed using a mass spectrometry GC-MS multiresidue method.

Following the first cycle of soil remediation, HCH, primarily represented by the persistent β -HCH isomer, was completely removed. The Σ DDT concentration decreased 14 times, and the concentration of p,p'-DDT, the main component of commercial DDT, decreased 25 times in soil treated with PVP-nZVI.

A quantitative analysis of bacteria from various physiological groups involved in nitrogen transformation processes was performed. The application of PVP-nZVI in combination with soy extract stimulated the growth of ammonifying bacteria, resulting in a population that was two times higher compared to the control – natural attenuation. No significant changes were observed in the abundance of oligotrophic bacteria or bacteria assimilating mineral forms of nitrogen. The obtained results highlight the role of nZVI in the nanobioremediation of soil contaminated with OCPs.

Acknowledgments: This research work was funded by Government of Republic of Moldova, Ministry of Education and Research, Research Subprogram 020101 "InBioS - Innovative biotechnological solutions for agriculture, medicine and environment".

Keywords: zerovalent iron nanoparticles, organochlorine pesticides, soil microbiome, nanobioremediation

PHYSICO-CHEMICAL ANALYSIS, SYNTHESIS METHODS AND APPLICATIONS OF LAWSONE (2-HYDROXY-1,4-NAPHTHOQUINONE)

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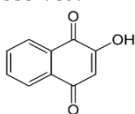
Lawsone (2-hydroxy-1,4-naphthoquinone) is a natural compound of significant importance in cosmetics, material science, and pharmacology. It is the active pigment found in *Lawsonia inermis* (henna), responsible for the characteristic reddish color imparted to the skin and hair. Due to increasing interest in natural bioactive substances, lawsone has become a relevant subject in organic chemistry, biochemistry, pharmacology, and toxicology.

The *Lawsonia inermis* plant, part of the Lythraceae family, is native to tropical and subtropical regions of Africa, South Asia, and the Middle East. Phytochemically, lawsone is one of the most concentrated compounds in the leaves, comprising up to 2% of the plant's dry weight.

Molecular structure and properties:

Lawsone consists of a substituted naphthalene ring with carbonyl groups at positions 1 and 4 and a hydroxyl group at position 2. It shows a UV absorption maximum around 485 nm (reddish-orange color).

In IR spectroscopy, characteristic bands of C=O and O–H functional groups are observed.



Physical properties: Orange-reddish crystalline solid with a mild phenol-like odor. **Melting point:** 190–192 °C **Solubility:** soluble in ethanol, ethyl acetate, and DMSO; poorly soluble in water **Density:** ~1.5 g/cm³ **Polarity:** moderate **Stability:** unstable in light and oxygen (easily oxidized)

Experimental methods used: UV-Vis and IR spectroscopy for functional group characterization, HPLC for compound purity analysis HPLC for compound purity analysis, Biological filtration tests for the removal of heavy metals and pathogenic microorganisms.

Environmental applications: These features make them suitable for modern purification and environmental detoxification technologies.

Acknowledgments: This study was supported by the research project “Optimization of the pharmaceutical properties and exploration of the reaction mechanisms of lawsone-based amino-hydroxy-naphthoquinones through computational chemistry and experimental analysis of plant-derived derivatives”, project code 010603, funded by Moldova State University and molo-romanian project “AZMETCA”. The author expresses deep gratitude to the scientific supervisors Acad. Prof. Gheorghe Duca and Corr. Member Dr. Habil. Flur Macaev, as well as to the advisors Dr. Habil. Olga Covaliova, Dr. Iolanta Balan, and Dr. Natalia Sucman. for their valuable guidance, continuous support, and scientific mentorship throughout the research.

Keywords: lawsone, Mannich base, bioactive compounds, multicomponent reaction.

EFFICIENCY OF COMBINING LR-GENES IN WHEAT BREEDING FOR DURABLE RESISTANCE

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Purpose. Research on the effectiveness of Lr genes of different ecological and geographical origin in the creation of source material with durable resistance to leaf rust.

Methods. Field, laboratory and statistical.

Results. For a long time, The Plant Breeding and Genetics Institute - National Center of Seed and Cultivar Investigation (PBGI - NCS CI) has been working on the cultivation of winter bread wheat varieties adapted to the modern requirements of agricultural sector. Over the past five years, in the conditions of climate change and the achievement of high productivity potential of modern varieties, the direction of breeding has changed somewhat towards increasing the adaptive potential to biotic and abiotic factors. One of them is the creation of varieties with durable disease resistance through the effective combination of genes of different origins in the genotype. Particularly, during research at the PBGI - NCS CI, high-productive almost isogenic lines with a complex of Lr genes were obtained, which, due to the additive effect, provide a consistently high rate of resistance to leaf rust (8-9 points), regardless of the infection load and growing conditions. The obtained breeding material was analysed by PCR method, which confirmed the presence of several groups of gene pyramids in the studied genotypes:

(Lr22a+Lr23+Lr32+Lr34+Lr46) – identified in the breeding lines JI21322, JI21422, and JI21622.

(Lr22a+Lr23+Lr26+Lr32+Lr34+Lr46) – identified in the breeding lines E13022, E13122, E13222, and E14422.

The presented source material was obtained on the genetic basis of local varieties with the involvement in crossbreeding of new genetic plasm of Western European origin, which resulted in several highly resistant to leaf rust and productive lines adapted to the current conditions of the southern steppe of Ukraine.

Conclusions. The resulting lines are valuable source material for breeding for durable resistance to major diseases and extreme climatic conditions, both in Ukraine and abroad.

Keywords: winter bread wheat, resistance, leaf rust.

OBTAINING AND EVALUATION OF CANNABIS SATIVA SEEDS EXTRACT AS AN INGREDIENT IN COSMETIC PRODUCTS

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Cannabis sativa seed extract contains many beneficial compounds, including lipids (mainly triglycerides with unsaturated fatty acids) (15-25%), polyphenols (1-3%), flavonoids (0.5-1.5%), phytosterols (1-2%), water-soluble proteins and peptides (5-10%), mono- and polysaccharides (5-10%), and minerals like magnesium, zinc, iron (1-2%), making it a useful ingredient for cosmetic products.

The purpose of this research was to obtain and characterize the extract from *Cannabis sativa* seeds as a potential ingredient in cosmetic creams with moisturizing and antioxidant properties. To achieve the proposed purpose, 50% ethyl alcohol and water were used as solvents to obtain the extracts. The extracts were obtained by three methods, such as maceration, microwave-assisted extraction, and ultrasound. To assess the extracts, we used the *ABTS* radical cation method to measure antioxidant activity, the *Folin-Ciocalteu* method to find the total polyphenol content, the aluminum chloride method to determine the total flavonoid content, and the phenol-sulfuric acid method to measure the total polysaccharide content.

According to the study's findings, the microwave-assisted extraction technique with ethyl alcohol as a solvent is the best way to obtain the extract. One to twenty was the ideal ratio for seed-solvent extraction. Based on dry matter, the results indicated a total polyphenol concentration of $2.26 \pm 0.14\%$, which is consistent with findings from earlier studies. The total flavonoid content was $0.74 \pm 0.07\%$, which falls within the limits presented in the specialized literature. The amount of polysaccharides is $7.36 \pm 0.11\%$. The results show that *Cannabis sativa* extract has a strong ability to act as an antioxidant, with values between 0.13 and 1.00 ± 0.03 mM ET. The free radical scavenging capacity (*ABTS* inhibition) ranged from 67.5% to 99.9%. The results obtained confirm that *Cannabis sativa* seeds are rich in biologically active substances and possess excellent antioxidant activity, making them a valuable ingredient for the cosmetic industry.

Acknowledgments: This study was supported by the research project 010603 – Advanced research in computational and ecological chemistry, identification of technological procedures for treatment, formation of water quality and quantity.

Keywords: *Cannabis sativa*, *ABTS*, antioxidant activity, microwave-assisted extraction.

THE SPREAD OF *KOELREUTERIA PANICULATA* LAXM. UNDER ECOLOGICAL CONDITIONS IN THE REPUBLIC OF MOLDOVA

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Koelreuteria paniculata Laxm. is a woody plant native to China, Korea and Japan. Grows to 8-10 meters in height. It is used for landscaping purposes, and also has honey-keeping properties. It prefers warm, sunny, frost-free, fertile soils, but also tolerates compacted, dry soils and even poor soils. She has a light temperament. Being a rare species in Moldova, the ecological, economic and social benefits of *K. paniculata* are little known.

The aim of the study is to analyse the natural framework in the Republic of Moldova where the species *K. paniculata* is widespread.

The research material consisted in the analysis of parcel descriptions from the forestry offices Olanesti (Tighina Forest Enterprise) and Taraclia (Silva-Sud Cahul Forest Enterprise), where *K. paniculata* is included in the composition of stands.

In order to achieve the aim, the method of bibliographical documentation, observation, analysis and synthesis was used.

The studied territory falls zonally in the moderate-continental climate sector, which is characterized by mild and short winters with little snow and warm summers, long-lasting, with a low amount of precipitation.

In the Republic of Moldova *K. paniculata* is generally widespread on plateaus and slopes, with a flat configuration. Altitudinally between 88-151 m, on west- and north-west-facing slopes (partly sunny). In relation to the slope of the land, most surfaces have a slope between 6-8 degrees. The most common soil types and subtypes on which the species is found are: typical chernozem soils, carbonate soils, cambic soils and typical erodisols. The most suitable forest stands are of hilly forest of cvercete with plantation-cultivated plantations, on slopes with varied exposures, ravines, with eroded soils, carbonate soils, deflooded, deteriorated, originating from chernozem, hydrologically deficient, of poor quality, and dialuric stalky forest on plateaus and slopes with low to moderately sloping, cambic, typical, carbonaceous chernozoniomic, carbonate, chernozicomoid soils, of poor quality. After analysing the vegetation in the study area, 2 types of forest were identified: sylvo-steppe forest, and pedunculate forest with prickly pear and poplar maple, both of lower productivity. The majority of the stands analysed with *K. paniculata* are artificial with lower productivity. This species grows to heights of 4-9 m with diameters of 6-16 cm at ages of 10-52 years. The average volume of wood mass per hectare is 2-16 m³/ha. Average volume growth varies between 0.2-1.0 m³/ha.

Acknowledgments: this study was carried out within the institutional program Development and implementation of good practices for sustainable agriculture and climate resilience (GREEN) no: 020407, subprogram 02.11.01.

Keywords: tree, natural setting, plant introduction, exotic species.

PERFORMANCE OF SOYBEAN VARIETIES GROWN IN ORGANIC AND CONVENTIONAL SYSTEMS

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An evident climate change and high demands for domestic non-GMO protein sources in Europe support the concept of introducing soybean into organic farming systems. Given that most of the soybeans produced in Serbia are used for animal feed, soybean varieties without Kunitz trypsin inhibitors (KTI) represent a valuable raw material for the processing industry since they require a shorter period of thermal treatment at a lower temperature. This not only enhances the efficiency of the processing methods but also improves the overall nutritional value of the feed.

The aim of the study was to compare agronomic performance of three soybean varieties lacking KTI developed at the Maize Research Institute Zemun Polje (Lana, Laura and L0333) with standard grain type cultivars grown in parallel systems of conventional and organic production. The trials were set up in conventional and organic fields at location Pancevo in year 2024. Soybean varieties from maturity group 0 (Selena and L03), I (Jasminka and Laura) and II (Lidija and Lana) were scored for following agronomic traits: grain yield, plant height and number of nodes per plant. Varieties grown in the organic system achieved an average yield of about 200 kg less than the conventional cultivation system. The plant height was on average 10 cm lower in varieties grown in the organic system, as expected considering the competition with weeds in the early stages of growth. Consequently, the number of nodes as one of the components of the yield had on average higher values in varieties grown with the application of conventional agricultural techniques. The smallest yield reduction in organic production was observed for the experimental line L0333 and the Lana variety, while the Jasminka variety had an almost identical yield value in both production systems. Bearing in mind that the genotypes L0333 and Lana are characterized by the absence of KTI in the grain, their good tolerance to the reduced application of agrotechnical measures qualifies this varieties as potential ideotypes for organic production.

Acknowledgments: This study was supported by the research project 451-03-136/2025-03 funded by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia.

Keywords: soybean, yield, KTI, agronomic performance, organic.

SYNTHESIS AND CHARACTERIZATION OF PYRIDOXAL THIOSEMICARBAZONES WITH ORTHO AND PARA-ANESIDINE

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Thiosemicarbazones represent a class of compounds with significant scientific interest due to their medicinal properties, such as antifungal, anticarcinogenic, and antiproliferative activities. Thus, they are widely used in the treatment of various diseases, including different types of cancer, leukemia, and others. Most drugs used in medical practice are organic substances or coordination compounds with 3d metals [1–3]. Branched-chain amino acids (BCAAs) are part of the treatment for hepatic encephalopathy (HE) and contribute to increased cerebral perfusion [3]. Ortho- and para-anisidine are also compounds of major importance in the treatment of various conditions. Given these properties, we aimed to synthesize thiosemicarbazones that can later be complexed with metal salts, thus obtaining compounds with antitumor, antifungal, and antiproliferative activity. The synthesis of thiosemicarbazones was carried out according to the reaction scheme below, resulting in two yellow-colored solid compounds.

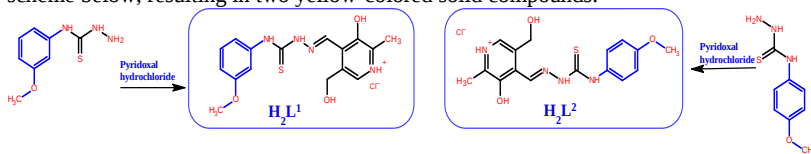


Figure. Scheme of the synthesis of 2-[[3-hydroxy-5-(hydroxymethyl)-2-methylpyridin-4-yl]methylene]-N-(3-methoxyphenyl)hydrazine-1-carbothioamide (H2L1) and 2-[[3-hydroxy-5-(hydroxymethyl)-2-methylpyridin-4-yl]methylene]-N-(4-methoxyphenyl)hydrazine-1-carbothioamide (H2L2)

Thiosemicarbazones are obtained using the same general method. In a round-bottom flask, 1 equivalent of N-(4-methoxyphenyl)hydrazinecarbothioamide or N-(2-methoxyphenyl)hydrazinecarbothioamide and 1 equivalent of pyridoxal hydrochloride are added, using ethanol as the solvent. The flask is placed on a magnetic stirrer and heated under reflux with stirring at a controlled temperature for approximately 1–3 hours, while periodically monitoring the consumption of the amine by chromatography. After the starting materials are fully consumed and this is confirmed chromatographically, the formation of an intense yellow compound is observed, representing the final product, with qualitative yield.

Acknowledgments: This research was funded by the subprograms 010602, of the institutional project, Republic of Moldova.

Keywords: thiosemicarbazones, biological properties, synthesis methods.

INVESTIGAȚIE TERMODINAMICĂ A INTERACȚIUNILOR SINERGICE ȘI ANTAGONISTE ÎN EXTRAȚIA METALELOR ÎN SISTEML LICHID - LICHID

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Pentru prima dată, o abordare termodinamică riguroasă a echilibrului chimice complexe este utilizată pentru a prezice, teoretic, fenomenele de synergism și antagonism în sisteme lichid – lichid multicomponent. Studiul propune o metodologie termodinamică de analiză a reacțiilor simultane implicate în extracția metalelor cu solvenți, bazându-se pe date termodinamice standard tabelate. La baza acestei metode stă o ecuație de reacție generalizată (ERG), care încorporează reacțiile paralele din ambele faze și permite identificarea condițiilor în care apar synergismul și/sau antagonismul. Prin analiza termodinamică a reacțiilor concurente descrise de ERG, se pot determina precise condițiile experimentale ce favorizează aceste fenomene. În plus, este elaborată definiția coeficientului sinergic, exprimat prin fracții molare parțiale ale speciilor implicate. Studiul arată că antagonismul nu apare în absența complexării ligandului neutru A, nici atunci când acesta formează în faza organică doar complecși atât de slabi încât pot fi neglijăți, contrazicând ideea că excesul de ligand A sau L generează în mod automat comportament antagonist. Această concluzie, demonstrată printr-o formulă generală valabilă pentru toate sistemele analizate, evidențiază necesitatea evaluării corecte a interacțiunilor dintre liganzi pentru a evita interpretările eronate ale fenomenului de antagonism. Datele obținute pentru sistemele eterogene analizate se aliniază celor raportate experimental în literatură, confirmând robustețea metodologiei. Acest cadru oferă astfel o bază teoretică solidă pentru prezicerea synergismului și antagonismului chimic, pe baza datelor termodinamice tabelate, în funcție de compoziția chimică și pH-ul specific sistemelor de extracție lichid – lichid. Relațiile obținute pot fi integrate în software, permițând identificarea rapidă a condițiilor de synergism și antagonism pe baza datelor termodinamice tabelate pentru o anumită compoziție chimică și o anumită valoare a pH-ului.

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Keywords: antagonism, coeficient sinergic, echilibre chimice, ecuație de reacție generalizată, extracția metalelor cu solvenți, sistem bifazic, termodinamică chimică.

MODELARE TERMODINAMICĂ A INTERACȚIUNILOR FIZICO-CHIMICE ÎN ECOSISTEME ACVATICE MULTICOMPONENTE ETEROGENE

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Ecossistemele acvatice sunt medii dinamice în care multiple procese fizico-chimice se întrepătrund, determinând soarta poluanților, nutrienților și a altor specii reactive. În acest studiu, propunem un cadru de modelare termodinamică bazat pe principiile bilanțului de masă, adaptat pentru sisteme multicomponente în două faze (lichid – solid). Modelul folosește metoda concentrației reziduale pentru a integra ecuațiile fundamentale de bilanț de masă, aplicându-se sistemelor eterogene formate dintr-o fază solidă minerală și o soluție saturată multicomponentă.

Prin simularea proceselor cheie, adsorbție, desorbție și reacții complexe, modelul oferă informații detaliate despre comportamentul substanțelor în mediu acvatic. Folosind o ecuație de reacție generalizată, studiul investighează termodinamic funcțiile de reacție ale hidrolizei ionilor metalici, protonării liganzilor și formării complexilor de compoziție stoichiometrică arbitrară. Metodologia permite estimarea cantităților din faza solidă pornind de la compoziția inițială și pH-ul soluției și poate fi extinsă la sisteme cu reacții suplimentare.

Metodologia elaborată investighează condițiile termodinamice ce guvernează diverse procese, utilizând funcții termodinamice generalizate. Având în vedere complexitatea speciilor metalelor grele și potențialele efecte negative asupra mediului și proceselor industriale, analiza termodinamică devine indispensabilă. Studiul abordează multiple interacțiuni chimice în soluții apoase, subliniind influența pH-ului asupra comportamentului termodinamic al acestor sisteme.

Modelul termodinamic avansat se validează în concordanță cu date experimentale existente, demonstrând aplicabilitatea în condiții reale. Relațiile derivate oferă instrumente pentru optimizarea condițiilor de transformare minerală (de exemplu, într-o altă fază solidă), sinteza substanțelor prin precipitare, îmbunătățirea tehnicilor de coprecipitare și a precipitării fracționate din soluții omogene. Pe baza unei evaluări riguroase a datelor experimentale relevante, studiul investighează principalii parametri și condițiile de mediu care dictează evoluția procesului.

Acest cadru oferă unelte științifice robuste pentru evaluarea interacțiunilor fizico-chimice în ecosisteme acvatice, susținând decizii informate în politici de mediu și gestiunea durabilă a resurselor de apă.

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Keywords: ecosisteme acvatice, coeficient sinergic, echilibre chimice, ecuație de reacție generalizată, extracția metalelor cu solvenți, sistem bifazic, termodinamică chimică.

SPECIES COMPOSITION OF WEED COENOSIS IN SUNFLOWER CROPPING IN THE WESTERN POLISSIE ZONE

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The goal. To study the species composition of weed coenosis and the sunflower protection system in the Western Polissya zone.

Research methods. The research is based on field experiments using the following methods: visual - to determine the phenological phases of growth and development of the crop, the species composition of weeds; counting - to determine the number of weeds, parameters of crop structure and crop yield; chemical – to determine the content of nutrients in the soil; mathematical and statistical – to assess the reliability of the research results. According to the analysis of the research results, it was noted that the species composition of weeds differed somewhat from year to year.

Sunflower is classified as a crop with high competitiveness concerning weeds, although it is characterized by slow growth at the beginning of the growing season and quite spacious phytocenotic boundaries with a wide-row sowing method. Various types of weeds, in which the biology of development coincides with the biology of the crop, which greatly increases competition for life factors and harmfulness are developed in such niches free from crops. In this regard, weeds in sowing of this crop are able to form a large vegetative mass, which restrains the growth and development of cultivated plants and sometimes completely suppresses.

However, the majority of weeds characteristic of the research area were observed every year. In particular, *Viola arvensis* Murr. 53,5 pcs./m², *Echinochloa crus-galli* L. – 380,4 pcs./m², *Stellaria media* L. – 8,7 pcs./m², *Polygonum convolvulus* L. – 13,5 pcs./m², *Cirsium arvense* L. – 8,0 pcs./m², *Amaranthus retroflexus* L. – 156,1 pcs./m², *Melandrium album* Mill. – 10,0 pcs./m², *Chenopodium album* L.- 47,2 pcs./m², *Elytrigia repens* L. – 10,6 pcs./m², *Raphanus raphanistrum* L.- 17,0 pcs./m², *Capsella bursa pastoris* L. – 7,2 pcs./m².

During the research years (2021-2023) the largest number of weeds in sunflower crops was observed in the variant without herbicides (control), which was 716,7 pcs./m², the predominant number of which, 380,4 pcs./m², was *Echinochloa crus-galli*.

The highest technical efficiency of soil herbicides Proxonil 720, KE (2,2 l/ha) and Pledge 50, ZP (0,12 l/ha) was at the first registration (7 days after emergence) and was 94,4 -97,7%. 21-24 days after spraying with soil herbicides, the appearance of a new wave of weeds was observed. The largest share in the weed community was occupied by *Echinochloa crus-galli* from 76 to 83% (Photo 1., 2).



Photo 1. Control (without herbicides)



Photo 2. Soil herbicides+graminicide

In the variants where soil herbicides and graminicide were applied, the number of weeds did not exceed 51,4 pcs./m², which is 4 times less than when using only soil herbicides (196,2 – 207,3 pcs./m²) and 16,7-17 times (43,0-42,2 pcs./m²) than in the control. The yield of sunflower seeds was 2,49 – 2,53 t/ha with an intensive protection system and in the absence of a protection system, the yield was at the level of 1,35 t/ha. Analysis of the economic efficiency of sunflower cultivation over the years of research showed that, compared with the control, the use of soil herbicides allowed to increase the conditional net income by 16,5 times, and with an intensive protection system by 21,1 times.

Keywords: *sunflower, weeds, spraying, herbicides, efficiency, protection.*

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Session C

GENOMICS AND ADVANCED BIOTECHNOLOGIES IN AGRICULTURE, INDUSTRY AND ECONOMY

RACES OF PARASITE *OROBANCHE CUMANA* WALLR PRESENT IN SOME AREAS FROM ROMANIA IN YEAR 2024

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Broomrape (*Orobancha cumana*) represent the most important biotic factor which affect seed yield of sunflower culture especially in south-east of Romania. In year 2024 we collected broomrape populations from eight locations, Călărași 1, Călărași 2, Călărași 3, Tulcea 1, Tulcea 2, Constanța, Brăila 1, Brăila 2 and we tested 12 differential genotypes in artificial conditions, in greenhouse to identify the races present in these areas. Differential genotype KA41 (gene *Or1*) has no attack only in location Călărași 3 where is not present race A of broomrape and in all other locations is present race A. Differential genotype J8281 (gene *Or2*) has attack only in location Tulcea 1 where is present race B of broomrape and in all other locations is absent race B. Differential genotypes Record (gene *Or3*), LC 1002 (gene *Or4*), LC 1003 (gene *Or5*), LC 1093 (gene *Or6*), 1010xA2Deb, Performer (no *Or* gene), *BR4* has attack in all seven locations and race C, D, E, F, G of broomrape is present. Differential genotype P96 (genes *Or5*, *Or6*) has no attack only in location Călărași 1. Differential genotype 0305C x P9Mo (genes *OrMoOrMo*) resistant at race G+ of broomrape has no attack only in location Călărași 3. Differential genotype Neagra de Cluj resistant at race H+ of broomrape has no attack in locations Călărași 1, Călărași 3, Tulcea 1 and Brăila 1. The most virulent races of parasite *Orobancha cumana* from Romania in year 2024, are in locations Călărași 2, Constanța and Tulcea 2.

LONG-TERM MOLECULAR TESTING THE SPREAD OF TOMATO STOLBUR IN MOLDOVA

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Tomato stolbur caused by the pathogen '*Candidatus* Phytoplasma solani' is a major threat to tomato production, affecting its qualitative and quantitative parameters, which can lead to a loss of productivity of up to 70-100%. Numerous factors influence the spread of phytoplasma, including climatic conditions, insect vectors, perennial plants and others. Thus, long-term monitoring is essential for understanding the patterns and dynamics of phytoplasma distribution and establishing a control strategy.

The aim of our study was to detect and compare the distribution of tomato stolbur infection in different years. Molecular detection of phytoplasma was carried out on local tomato genotypes collected from experimental fields of IGPPP, MSU from 2016 to 2024. DNA was isolated using express method by boiling thin sections of tomato peduncles in alkaline solution. Molecular analysis was performed using nested-PCR techniques with chaperonin primers specific for '*Ca. P. solani*' pathogen. Results were visualized in 1.5 % agarose gel electrophoresis under UV light. This study offers the first molecular assessment of stolbur incidence trends in local Moldovan tomato varieties over a nine-year period.

The data demonstrate a significant difference between phytoplasma infection across the years of study. In 2016, molecular diagnosis of tomato showed a mass infestation with stolbur, reaching 92%. In 2017, this level decreased considerably – less than half of the tomato were infected with phytoplasma (42%). In 2018, the infection rate with '*Ca. P. solani*' raised again reaching 72.5% at the end of the growing season. In 2019, the infection level remained high, with an incidence of 66.67%. In the following years, a significant decrease in the percentage of infected plants was observed, being of 15% in 2020 and remaining at a similar level in 2022 (16.7%). However, in 2023, a sudden increase in the incidence rate was observed, reaching 72.2%, In 2024 a high value of infection was maintained (60%). These results are quite comparable to the results of the first years of the study.

Obtained data reflect the temporal variability and the undulating pattern of '*Ca. P. solani*' distribution. These confirm the need for long-term research to understand the epidemiological situation and to develop effective control measures.

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Keywords: '*Candidatus* Phytoplasma solani', stolbur spread, nested-PCR, tomato.

RESULTS OBTAINED FROM THE EVALUATION OF LAVENDER VARIETIES - CLONES

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In the Republic of Moldova, lavender cultivation has become highly sought after in both agriculture and the country's industry. In order to expand industrial and private plantations, breeding research has been conducted to develop hybrid-origin varieties adapted to the soil and climate conditions, with high values in quantitative traits, increased production of high-quality essential oil, and fine aroma.

The research material consisted of sixth-year lavender clone varieties included in Comparative Contest Cultures. The planting scheme was 1.4 x 0.6 m. Phenological notes, biometric measurements, and evaluation of quantitative traits were performed in accordance with current methodologies. The essential oil content was determined during the flowering phase of the species through hydrodistillation using Ginsberg apparatus, recalculated at standard moisture (60%).

The year 2024 was marked by severe drought throughout the vegetation period. The lavender varieties under study developed plants with heights ranging from 68.5 cm (VM-18) to 94.8 cm (Svetlana). Plant diameters varied from 95.6 cm (VM-18V) to 132.1 cm (Svetlana). The number of flowering stems per plant is a key productivity trait. This indicator ranged from 940.0 to 3023.0 units. The highest number of floral stems was recorded by the impure variety *Favoare* (2503 units.), followed by the medium hybrid *Cr.13S-6-7* (2842 units.), and the late variety *Svetlana*, which showed 3023 units. The lavender clone varieties stood out for their ability to accumulate and synthesize essential oil in the raw material. Some evaluated varieties accumulated essential oil content at standard moisture (60%) above 2% (*Alba 7* – 2.188% and *Svetlana* – 2.199%). When recalculated to dry matter, the content exceeded 5% (*Alba 7* – 5.472% dry matter, *Svetlana* – 5.498%).

The created and evaluated lavender clone varieties are characterized by well-developed plants that form a large number of stems and inflorescences per plant, with high essential oil content in the raw material of superior quality, meeting the demands of agricultural producers, peasant households, and specialized firms in the cultivation of this species.

Acknowledgments: This study was supported by the research project 011102 "Increasing and conservation of genetic diversity, agricultural crop breeding in the context of climate change," funded by the Ministry of Education and Research of the Republic of Moldova.

Keywords: Clone varieties, lavender, essential oil, standard moisture, flower stems.

OIL CONTENT IN SEEDS BY NMR RELAXATION METHOD

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The aims of our work were to evaluate by NMR relaxation method the oil content in seeds of different cultures, including soybean varieties in years of different rainfall conditions (2020, 2021 and 2022). Determination of oil content in seeds by NMR relaxation method is a clear, nondestructive, fast and accurate alternative to traditional liquid chemistry methods. The oil content determined by NMR relaxation method strictly corresponds to the amount of oil extracted from the seeds by organic solvents and that is why the NMR relaxation method of seed oil content determination is one of the international standards.

The objects of the study were three cultures (soybean *Glycine max* L., saffron *Cárthamus tinctórius*, walnut *Júglans régia*), inclusive two soybean varieties of the different maturity group (MG): Pentata (MG III) and Ladutsa (MG II). The oil content of seeds was measured using a modernized NMR relaxometer (Panov P., Kharchuk O., 2014). The measurements were performed on individual seeds and the oil content was determined by comparing echo-signal amplitudes from seeds with echo-signal amplitudes of calibration standards with different oil contents.

The maximum oil content (70%) was in the kernels of *Júglans régia* nuts. The oil content in seeds of soybean *Glycine max* L. is significantly lower (15-25% of the dry weight). The seeds of saffron *Cárthamus tinctórius* contained $33 \pm 1\%$ of oil. The minimal oil content in soybean seeds was determined for variety Pentata: 14,6-15,0% at harvest 2021. The maximal oil content in seeds was determined for soybean variety Ladutsa at harvest 2021: 19,3 - 19,7%. After harvest 2020 oil content in Pentata variety seeds were higher than after harvest 2021. After harvest 2022 oil content in seeds of this variety became higher than after harvest 2021.

Based on the meteorological data for 2020, 2021 and 2022, it follows that soybean seeds of the Pentata variety under normal conditions of moisture supply (2021) are characterized by a reduced oil content compared to the conditions of extremely severe drought (2020 and 2022).

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Keywords: seeds, oil content, RMN relaxation.

FE₃O₄ NANOPARTICLES AS BIOSTIMULATOR OF LIPASES SYNTHESIS IN THE FUNGAL STRAIN *FUSARIUM NIVALE* FD 13L

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Lipolytic enzymes, especially microbial lipases, play a key role in various industrial processes. These enzymes are widely used in medicine, biotechnology, detergent production, the food industry, as well as for the hydrolysis of fats and oils. There is also strong interest in discovering new microbial lipases for biodiesel production, ester and biodegradable biopolymer synthesis. Due to their ability to function at extreme temperatures, pH stability in organic solvents, and selective action, lipases derived from filamentous fungi have broader applications.

Nanoparticles (NPs) characterized by high stability, target selectivity, and plasticity are widely used in various processes, including the manipulation of bioactive substance synthesis in microorganisms. This study investigates the effects of Fe₃O₄ (50-100 nm), Cu (60-80 nm), ZnO (≤50 nm), and TiO₂ (<100 nm) NPs on lipase synthesis in the fungal strain *Fusarium nivale* FD 13L during submerged cultivation.

F. nivale was cultivated in flasks at 30°C on a rotary shaker for 144 hours. NPs were introduced into the cultivation medium concurrently with the seed material, while the control group consisted of the strain grown in medium without NPs. Enzymatic activity was measured using the Otto-Yamada method. An increase in lipolytic activity compared to the control was observed only in samples cultivated with Fe₃O₄ NPs. Notably, the cultivation cycle was shortened by 24 hours, which presents significant economic benefits. The optimal stimulation effect was achieved with iron NPs at a concentration of 10 mg/L, with enzymatic activity on the fourth day of cultivation reaching 3812.5 U/ml - comparable to the control's 3592.0 U/ml on the fifth day - and 37% higher than the control on the same day.

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Keywords: nanoparticles, fungi, lipases.

VALUABLE F₃-F₄ HYBRIDS OF *SALVIA SCLAREA* L., WITH QUANTITATIVE CHARACTERS

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Salvia sclarea L., aromatic and medicinal species of the *Lamiaceae* family, which is cultivated for the essential oil that is synthesized and accumulated in the inflorescences. The oil of this species is used in the treatment of hypertension, catarrh, tonsillitis, menstrual pain, inflammation of the skin with a tendency to aging, etc. This oil has a high appreciation in the perfumery industry, being highly appreciated for its excellent aroma and its quality as a fixative of aromas. The evaluated breeding material is represented by 37 simple, triple, double, stepped and complex F₃–F₄ hybrids of *S. sclarea*, in the first and second year of vegetation.

Evaluating the diversity of quantitative characters in sage hybrids, it was demonstrated that they possess excessive variability: the height of the plants ranged from 107.3 to 139 cm depending on the genotype, and the length of the inflorescence, a character on which the yield of the hybrid largely depends—from 51.5 to 71.6 cm. The ratio of inflorescence length/plant height was higher than 65% in 11 of the evaluated genotypes. The best correlation was demonstrated by two simple hybrids (NC 11-11S₃ x NC 6-11S₃)F₃ and (AP 49-11S₃ x NC 61-11S₃)F₃, 69.0 and 69.6% respectively. The number of branches of the first degree of inflorescence varied from 12.8 to 18.0, and those of the second degree—from 22.4 to 52.0. The best indices were attested in two step hybrids [(Cr.p.1 S₁x M-69)F₁₂ x (S-3 x M-69)F₂ x Cr.p.1S₂)F₈]F₄ and [(0-42 x Rubin)F₁ x S-786)BC₇ x AP 60-11S₃]F₃ and a simple hybrid combination (Cr.p 99S₁₃ x AP 52-11S₃)F₃: 54.4, 56.9 and 69.8 branches, respectively.

Determination of the essential oil content, recalculated to dry matter, demonstrated that the evaluated hybrids recorded values ranging from 0.621–2.011% in the first year and 0.943–2.470% in the second year of vegetation. With an essential oil content higher than 1.400%, 14 hybrids were highlighted and selected. Exceptional were the simple hybrids (NC 11-11 S₃ x NC 6-11 S₃)F₃, (AP 30-11 S₃ x NC 6-11 S₃)F₃ and (Cr.p 99S₁₃ x AP 52-11S₃)F₃ with 1.942, 1.999 and correspondingly 2.470% (dry matter), essential oil.

The research carried out resulted in the selection of sage hybrids with a very high content of 1,400-2,470% (s.u.) essential oil. The selected hybrids represent a valuable material for the development of high-performance varieties of *S. sclarea* L.

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Keywords: *Salvia sclarea* L., hybrid, the quantitative characters, essential oil.

EVALUATION OF LINSEED POPULATION ACCORDING TO PHENOTYPE AND MAIN ECONOMIC VALUE INDICATORS

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Linseed or flax (*Linum* L.) is one of the eight founding crops of agriculture (emmer wheat, einkorn wheat, barley, lentil, pea, chickpea, bitter vetch), are considered the earliest crops to be domesticated by humankind.

As biological material used in this study, we have a population of linseed (*Linum usitatissimum* L.) (intermediate morphotype), from which, by the method of the individual selections, we obtained five specific new shapes: *In g-12*, *In g-13*, *In g-121*, *In g-122*, *In g-123*. A common characteristic (flower-related*) that has been maintained within the population is size the flowers, the colour of its corolla and its anthers: flower diameter at opening was 25.3 ± 0.03 mm (CV 5.40%); the flowers are white with pinkish-beige anthers. According to seed coat color, plants were classified into three phenotypic classes: yellow (*In g-13*, *In g-12*), variegated (*In g-121*, *In g-122*) and greenish-brown (*In g-123*).

The weight of a seeds varies between 5.46 ± 0.09 mg, CV 7.15% (*In g-123*) - to 8.38 ± 0.23 mg, CV 12.16% (*In g-121*). The weight of 1000 seeds (WTS) for the *In g-123* seeds was as low as 5.29 g and as high as 7.27 g for the *In g-121*, respectively. The samples were also appraised on the seeds production per 1m^2 : the max. value reached is 259.0 g/m^2 (*In g-121*) and the max. % of oil content: $42.2 \pm 0.36\%$, CV 1.50% (*In g-12*). The growing season is short to medium (≈ 110 days). In conclusion, the *In g-121* and *In g-12* samples are of value as ameliorative material, but from the point of view of diversification of the genetic base in the *ex situ* flax collection, all germplasm sources analyzed are of interest.

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Keywords: *Linum* L., linseed, colour, seed, flower, anthers, productivity.

INFLUENCE OF PHOTOPERIOD ON PRODUCTIVITY AND SPECTRAL INDICES OF LEAF BLADES OF GARDEN CRESS SAMPLES GROWN UNDER LIGHT CULTURE CONDITIONS

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Identification of optimal growing conditions and promising genotypes for specific environmental parameters using modern non-invasive methods is an urgent task. In this work, spectral indices of leaf blades of 17 accessions of garden cress (*Lepidium sativum* L.) from the VIR collection were studied for the first time under strictly controlled conditions of an agrobiopolygon under different photoperiods (12, 14, 16 h), as well as the productivity of these accessions. As a result of the work, photoperiods of 12 and 16 h were determined as the most favorable for growing garden cress accessions under light culture conditions. Accessions of garden cress, k-112 (Local, Azerbaijan) and k-165 (Gartenkresse, Belgium), were selected as the most productive and promising for cultivation under light culture conditions. Based on the data obtained, it was established that optical indicators can be an effective non-invasive criterion for identifying the most optimal duration of photoperiod for realizing the production potential of garden cress samples, and also serve as predictors for determining the most productive genotypes of interest for subsequent breeding work.

Garden cress (*Lepidium sativum* L.) is an early maturing, responsive crop with valuable biochemical composition, which makes it a promising crop for cultivation under light culture conditions [5, 6]. Light culture implements an approach based on satisfying all the basic needs of the plant and eliminating stress factors affecting their growth and development, and also allows for the selection of optimal environmental conditions for specific crops or genotypes. One of the important objects of selection and regulation are the parameters of the light environment, in particular, the photoperiod [3]. Identifying optimal growing conditions and promising genotypes for specific environmental parameters using modern non-invasive methods is an urgent task.

The purpose of the study is to study the effect of photoperiod on the productivity and optical parameters of leaf blades of garden cress samples grown under light culture conditions.

Materials and methods. The objects of the study were 17 accessions of garden cress (*Lepidium sativum* L.) of different origin, obtained from the collection of Vavilov all-Russian Institute of Plant Genetic Resources (VIR): k-1 (Garten kress, Germany), k-27 (Fine curled, Canada), k-41 (Broad leaf, Canada), k-42 (Narrow-leaved 3, Russia), k-48 (no name, Azerbaijan), k-63 (no name, Georgia), k-66 (no name, Afghanistan), k-78 (Local, Russia), k-79 (Local, Russia), k-85 (Cresson aienois, France), k-91 (no name, Iran), k-97 (Local, Armenia), k-112 (Local, Azerbaijan), k-118 (no name, Pakistan), k-127 (Local, Azerbaijan), k-165 (Gartenkresse, Belgium), k-185 (Almindelig, Denmark). The vegetation experiments were conducted under strictly controlled conditions of the agrobiological testing ground of the Agrophysical Research Institute (AFI). The plants were grown using flow hydroponics under three light conditions: 12, 14 and 16 hour photoperiod. The light source was gas-discharge mirrored sodium lamps DNaz-400 (manufactured by OOO Reflux, Russia), and the substrate was peat-based soil Agrobalt-S

(OOO Pindstrup, Russia). A modified Knop solution was used for flow hydroponics. The experiment was repeated three times, the sample size was 16 plants. The morphological description of the cress plants was carried out in the phase of technical maturity on the 26-29th day after sowing, in accordance with the methods of the Federal State Budgetary Institution State Commission for Variety Testing - RTG/02485/1; RTG/01/3 (OOS test methods). Reflectance spectra of leaves were recorded before harvesting using a miniature fiber-optic spectrometric system from Ocean Optics (USA). The following indices obtained as a result of contact spectroscopy were evaluated: chlorophyll index ChlRI, carotenoid to chlorophyll ratio index SIPI, photochemical index PRI [4, 5]. The PRI index in this work was used with the modification $((C1-PRI)*C2; C1=0.1; C2=10)$, hereinafter referred to as PRI_{mod}, and characterizes non-photochemical quenching. Statistical data processing was performed using the STATISTICA v.10.0 program (StatSoft Inc., USA).

Results and discussion. Plant mass is one of the features characterizing productivity for green crops. Under photoperiods of 12 and 16 hours, the production potential of garden cress samples was realized most fully – significantly higher mass values were noted than under a photoperiod of 14 hours (by 1.01 g and 1.34 g, LSD₀₅=1.01). Most of the optical parameters we used also changed significantly in plants grown under different photoperiods (Table 1).

Table 1. Productivity of garden cress (*L. sativum*) samples and some optical parameters, depending on the photoperiod

Indicator	Photoperiod, h			LS D05
	12	14	16	
Mass of 1 plant, g	3,55± 0,44	2,54± 0,18	3,88± 0,28	1,0 1
ChlRI	0,37± 0,01	0,40± 0,01	0,41± 0,01	0,0 5
SIPI	1,00± 0,00	1,01± 0,00	1,00± 0,00	0,0 1
PRI _{mod}	0,34± 0,16	0,32± 0,14	0,33± 0,15	0,4 6

Note: n=16, mean ± SEM. LSD - Least Significant Difference.

The chlorophyll index value increased significantly with increasing photoperiod, indicating the accumulation of green pigments under longer illumination. Similar dynamics of an increase in the content of green pigments was previously obtained for other representatives of the Brassicaceae family under light culture conditions [6]. Under the least favorable photoperiod of 14 hours for the accumulation of green mass, the SIPI index, representing the ratio of carotenoids to chlorophyll, increased. The growth of this ratio was caused by a significant increase in the amount of carotenoids, which is part of the adaptation to unfavorable conditions. No reliable differences in the PRI_{mod} index were noted, which is associated with high variability within the set of studied genotypes for this indicator.

As a result of the study, the most promising genotypes for growing in photoculture were also noted - samples k-112 (Local, Azerbaijan) and k-165 (Gartenkresse, Belgium). They demonstrated high mass values relative to the average for the studied samples under favorable photoperiods of 12 and 16 hours (Table 2).

Table 2. Average weight of 1 plant of isolated samples of watercress (*L. sativum*), compared with the average for the studied varieties, under different photoperiods

Note: mean $\pm$ SEM. LSD - Least Significant Difference.

Samples	Photoperiod, h		
	12	14	16
k-112	6,04 $\pm$ 0,35	3,19 $\pm$ 0,13	5,64 $\pm$ 0,58
k-165	5,91 $\pm$ 0,32	3,00 $\pm$ 0,16	5,45 $\pm$ 0,33
Average across samples	3,60 $\pm$ 0,46	2,54 $\pm$ 0,18	3,88 $\pm$ 0,28
LSD05	1,17	0,66	1,29

Both samples were resistant to early stem formation under light culture conditions under all studied photoperiods – the beginning of stem formation was not recorded by the end of the growing season (26-29 days).

The non-photochemical quenching index PRImod had an inverse dynamic with the mass of 1 plant trait in the selected samples. Thus, the values of the PRImod index in the genotypes selected by mass - k-112 and k-165 were below the average for the samples (the difference was from 0.45 to 0.79, with LSD05 from 0.09 to 0.12).

Conclusion. In this work, the productivity and optical indices of 17 garden cress (*Lepidium sativum* L.) accessions from the VIR collection grown under strictly controlled conditions were investigated for the first time. Photoperiods of 12 and 16 h were identified as the most favorable for growing garden cress accessions under light culture conditions. Garden cress accessions k-112 (Local, Azerbaijan) and k-165 (Gartenkresse, Belgium) were identified as having the highest productivity and resistance to early stemming under light culture conditions under all studied photoperiods. Based on the data obtained, it was established that some optical indices can be an effective non-invasive criterion for identifying the most optimal photoperiod duration for realizing the production potential of garden cress accessions, as well as predictors for determining the most productive accessions with traits of interest for further breeding work.

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Keywords: garden cress, *Lepidium sativum* L., non-invasive methods, light culture, spectral indices.

DYNAMICS OF THE SPREAD OF CAUSAL AGENTS OF ENTEROCOLITIS IN THE PUBLIC HEALTH MEDICAL INSTITUTION AMT BUIUCANI, CHISINAU

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Acute diarrheal disease is caused by both pathogenic, opportunistic pathogens from the Enterobacteriaceae family, and by enterocolitis causative agents. Enterocolitis is easily transmitted from one person to another, especially if hygiene rules are not followed. It occurs mainly in the summer, due to the creation of a favorable environment for the development of bacteria and faster deterioration of food. Identification of these bacteria serves to detect sources of infection and apply effective treatment. The purpose of the research was to identify the causal agents of enterocolitis and elucidate the dynamics of its spread in MTA Buiucani Public Health Medical Institution, Chisinau municipality.

The research was conducted in 2011 – 2024. 188 strains (1.3%) of enterocolitis causative agents were isolated and identified from the 14335 clinical samples received in the Microbiological Laboratory of the above mentioned institution, for the diagnosis of acute diarrheal disease episodes. The basis of bacteriological analyses is the obtaining of pure culture of the pathogen and its subsequent study. The etiological confirmation of the disease was carried out on the basis of coproculture, according to the methodological indication "Microbiological diagnosis of intestinal infections", recommended by the Ministry of Health of the Republic of Moldova.

During the study period, 3 causative agents of enterocolitis were identified: *Pseudomonas aeruginosa* (fam. Pseudomonadaceae), *Acinetobacter* spp. (fam. Moraxellaceae) and *Aeromonas* spp. (fam. Aeromonadaceae). The highest share was registered in *P. aeruginosa* – 95.7%, while the genera *Acinetobacter* and *Aeromonas* had a share of 3.2% and 1.1%, respectively. *P. aeruginosa* was identified every year. Bacteriological confirmations of BDA, caused by this species had the highest incidence in 2022 (12.8%) and 2013, 2016 – 10.6% each. In the other years, the dynamics of circulation was lower, the share varying between 2.78% and 9.4%. *Acinetobacter* spp. was isolated in 2011, 2015, 2018, 2020, 2022 and 2024 – one strain each year, *Aeromonas* spp. – only in 2020 – 2 strains.

Continuous surveillance and implementation of infection prevention strategies are necessary to mitigate acute bacterial diarrhea, since enterocolitis causative agents have been identified as pathogens of nosocomial infections occurring in patients hospitalized for long periods.

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Keywords: causative agents of enterocolitis, dynamics, acute diarrheal diseases.

UNVEILING THE INTERNAL STRUCTURES OF SOME CULTIVATED ORCHIDS: A HISTO-ANATOMICAL PERSPECTIVE

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In this study the authors examined the histo-anatomical aspects of four distinct cultivated orchid species: *Miltonia Sunset*, *Oncidium-Cyrtocidium*, *Burrageara Nelly Isler "Yellow"*, and *Phalaenopsis*. The scope of this paper is to provide a more comprehensive and accurate documentation of their internal structures, thereby contributing to existing scientific knowledge and potentially revising previously established information. Research on orchids has been motivated by their remarkable morphological diversity, unique anatomical features, and significant ecological adaptations, in addition to their considerable economic and ornamental value.

To study the internal structure of orchid species, cross-sections were made through root, stem, and leaf, using a hand microtome and a razor. These sections were then double-stained with iodine green and ruthenium red, following a specific protocol of decolorization, washing and application of colorant. Finally, the preparations obtained were analyzed under the Optika Microscopes Italy microscope and analyzed with PROVIEW OptikaCam3 software, to observe the histological details. This systematic approach allowed for a clear differentiation of internal features, such as the number of cell layers in the velamen, the thickness of the cortical parenchyma, and the presence or absence of specific storage organs like pseudobulbs.

The findings revealed notable histo-anatomical differences among the species. For instance, the velamen layer in the roots varied significantly, ranging from 2-3 layers in *Phalaenopsis* to 6-7 layers in *Miltonia Sunset*. Similarly, the cortical parenchyma exhibited variations in thickness, with an average range of 10 to 30 cell layers. A significant distinguishing feature was the presence of pseudobulbs, specialized structures for water and nutrient storage, observed in *Burrageara* and *Miltonia*, but absent in the other analyzed varieties. These detailed anatomical observations provide valuable insights that enhance our understanding of orchid biology and aid in precise species identification.

Keywords: internal structure; orchid; velamen; diversity.

MARKER ASSISTED SELECTION: BIOCHEMICAL EVALUATION OF QPM HYBRID

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Traditional breeding relies heavily on phenotype-based selection, made on morphological bases that were highly influenced by the environment. The backcross procedure method has been extensively used in plant breeding to introgress favorable alleles from a donor plant into a recipient elite genotype (recurrent parent). The goal is to recover a pure line that will contain the novel allele and be as good as the recurrent parent for all other important traits. As the reconstruction of the recurrent parent genotype requires more than six generations, marker assisted selection (MAS) has gained immense importance as it precisely selects desirable plants and eliminates large scale biochemical estimation in the segregating generations.

Maize Research Institute Zemun Polje has a breeding program aimed to create quality protein maize (QPM), using the integrated conventional and molecular breeding approach. This refers to conversion of commercial inbred lines to their QPM counterparts and development of the QPM hybrids adapted to temperate climate. The aim of this study was biochemical evaluation of QPM hybrid, obtained by crossing adapted QPM inbred lines (commercial lines converted to thier QPM version through marker assisted backcrossing). Relevant nutritional parameters, such as tryptophan, protein, starch and lipid contents were analyzed, and quality index (defined as tryptophan to protein ratio) was determined.

Tryptophan content (TC) was significantly increased ($p < 0.05$) in QPM hybrid in comparison with standard maize hybrid. Also, TC was 0.075%, which corresponds to the QPM threshold value. Quality index (QI), although below the QPM threshold (which is 0.80%) was significantly higher ($p < 0.05$) in QPM hybrid, indicating improved nutritional quality of the protein. Starch and lipid content were both significantly higher ($p < 0.01$ and $p < 0.05$, respectively). Furthermore, highly significant correlation ($p < 0.01$) was identified between QI and starch content, as well as significant correlation ($p < 0.05$) between QI and lipid content, indicating the possibility of simultaneous selection and improvement of these traits in our breeding material. Biochemical evaluation has confirmed improved nutritional value of this QPM hybrid, thus it was identified as a promising hybrid for use in feed industry.

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Keywords: maize, MAS, QPM, tryptophan, quality index.

BIOMETRIC PARAMETERS OF POTATO PLANTS UNDER *IN VITRO* CONDITIONS

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The aim of the research was to study the effect of different nutrient medium compositions on the formation of biometric parameters of potato plants in *in vitro* culture. As a result of the research, it was established that the highest indicators of growth and development of plants *in vitro* were obtained in the variant using the nutrient medium developed at the Institute for Potato Research, with 3% sucrose content and light intensity of 2000 lux.

In 2023–2024, the Department of Biotechnology and Biotechnical Systems of the Institute for Potato Research of NAAS conducted research on the effect of different nutrient medium compositions and light intensity on the growth and development of *in vitro* plants of the Myroslava potato variety. The experimental design included four variants of nutrient medium composition and two variants of light intensity (2000 and 4500 lux).

During the research, the influence of various factors on the growth and development of plants from cuttings planted on nutrient medium according to the experimental design was studied. In the Myroslava variety, plant height on the 10th day after cutting with a light intensity of 2000 lux ranged from 2.8–3.1 cm. The highest plant height was observed in variant 3 (IPR medium with 2% sucrose content). When characterizing this parameter during further growth and development of plants *in vitro*, an increase in its value was established in variant 2. Accordingly, plant height was 4.4 cm on the 20th day and 7.2 cm on the 30th day after cutting. When characterizing the *in vitro* plants of the Myroslava variety by the number of internodes per plant, it was established that variant 2 was characterized by higher indicators throughout the entire period of plant growth and on the 30th day after cutting was 6.5 internodes/plant. Regarding internode height, it should be noted that its values were almost the same and ranged from 0.9–1.1 cm. That is, the medium composition did not affect the height of internodes in plants of the Myroslava variety. When studying the effect of higher light intensity (4500 lux) on the growth and development of Myroslava variety plants, lower values were established among all the studied parameters.

Keywords: *in vitro* plants, agar medium, potato, sucrose.

INFLUENCE OF VARIETIES AND ORGANO-MINERAL FERMENTATION ON THE PRODUCTIVITY OF WINTER RAPE IN THE CONDITIONS OF THE WESTERN FOREST-STEP OF UKRAINE

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The aim of the study. Study of the features of winter rapeseed yield formation in the conditions of the Western Forest-Steppe depending on the biological potential of the studied hybrids and the influence of intensification factors on changes in the morphological indicators of plants, the formation of maximum productivity and the production of environmentally friendly products competitive in the market environment.

Research methods. The research is based on field experiments using the following methods: counting and weighing - to determine the parameters of the crop structure and seed yield; chemical - to determine the content of nutrients in the soil; mathematical and statistical - to assess the reliability of research results; calculation and comparative - to determine the economic efficiency of cultivation technologies.

The experimental scheme provided for - varietal composition (Factor A): 1. Atlant; 2. Parallax; 3. DK Exima; 4. DK Expoz; foliar feeding (Factor B): 1. Without feeding (control); 2. Organic Balance (1,0 l/ha); 3. Helprost (1,0 l/ha); seed treatment (Factor C): 1. No treatment control; 2. Seed Oracle (1,0 l/t). The research was conducted on typical low-humus black soil within the land use of the Institute of Agriculture of Western Polissya NAAS.

As a result of the conducted research, it was found that the degree of wintering of winter rapeseed plants depended on the varietal and hybrid composition and was highest in hybrids DK Exima and DK Expoz 84,6-88,2 %.

The highest plant survival during the growing season, 93,7-95,7 %, was observed with seed treatment with Orakul seeds (1,0 l/t) in combination with foliar feeding with organo-mineral fertilizer Khelprost (1,0 l/ha) in the rosette and budding phase in the hybrid composition of winter rapeseed, with a plant density before harvesting within 43,6-48,8 pcs./m²ha.

The highest yield structure indicators were noted in the varietal-hybrid composition with pre-sowing treatment with Orakul seeds (1,0 l/t) in combination with foliar feeding with organo-mineral fertilizer Helprost (1,0 l/ha) in the rosette and budding phase, where the number of pods on one plant was 162 pcs., the number of seeds in the pod was 28,2 pcs., the mass of 1000 seeds was 4,22 grams in the Atlant variety and, respectively, 294 pcs., 31,6 pcs., 4,38 grams in the Paralaks hybrid. In hybrids DK Exima and DK Expoz, these indicators were within the range of 296-354 pcs. number of pods, 34,2-34,8 pcs. number of seeds, 4,45-4,46 grams weight of 1000 seeds.

According to the results of the research, it was found that the maximum yield of 2,61 t/ha, 4,05 t/ha, 4,44 t/ha and 4,62 t/ha was provided by the Atlant variety, the Parallax hybrids, DK Exima and DK Expoz, respectively, with pre-sowing treatment with Orakul seeds (1,0 l/t) in combination with foliar feeding with the organo-mineral fertilizer Helprost (1,0 l/ha) in the rosette and budding phase.

Keywords: winter rapeseed, seed treatment, foliar fertilization, productivity.

RESISTANCE OF SPRING WHEAT SPECIES TO POWDERY MILDEW AND SEPTORIA LEAF BLOTCH

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The modern common wheat genome is exhausting its potential for diversity of genes for resistance to pathogens. Therefore, *the purpose of research* was to identify samples from a collection of wild relatives of spring wheat that are potential carriers of genes for resistance to pathogens of powdery mildew and septoria leaf spot.

Materials and methods: The studies used spring samples from our collection of spring wheat relatives with different genomes from the National Center for Plant Genetic Resources of Ukraine (V.Ya. Yuriev Plant Production Institute of the NAAS of Ukraine). Wheat stability was evaluated according to Babayantz et al., 2014. Field studies conducted in 2022–2023.

Results. The spring wheat v. ‘Ulyublena’ (UKR) (*Triticum aestivum*, ABD genome) served as a control for the level of resistance – moderately susceptibility to the powdery mildew pathogen (score 5) and resistance (score 6) to the septoria leaf blotch. All samples of *T. spelta* var. *album* (genome ABD) from Canada and Australia are characterized by resistance (score 6) to powdery mildew and high resistance/resistance (scores 9 and 6) to septoria leaf blotch. However, samples of *T. spelta* var. *caeruleum* v. ‘Tridentina’ (ITA) and ‘CDC Zorba’ (CAN) are moderately susceptible to powdery mildew and septoria leaf blotch (score 5). Samples of *T. spelta* var. *arduini* (SPA) are moderately susceptible to powdery mildew (score 5) and resistant to septoria leaf spot at the control level. Samples of *T. dicoccum* var. *rufum* (UKR) (genome AB) and *T. dicoccum* var. *aerugenosum* (ARM) have high resistance to powdery mildew (scores 8-9) and resistance (score 7) to septoria leaf blotch. Samples of *T. dicoccum* var. *haussknechtianum* (AZB) are highly immune (score 9) to powdery mildew and resistant (scores 7-6) to septoria leaf blot. It is possible that it is in the chromosomes of groups A and B of these species that effective genes for resistance to the two pathogens are located.

Conclusions. The highest resistance to powdery mildew and septoria is detected in samples with AB genome from *T. dicoccum* species, as well as *T. spelta* var. *album* (ABD genome) from Canada and Australia. Their inclusion in breeding will enrich the spring wheat genome with potentially effective resistance genes.

Keywords: wheat genome, resistance, pathogen, powdery mildew, septoria leaf blotch

RESISTANCE OF WINTER WHEAT VARIETIES TO A GROUP OF LEAF DISEASE PATHOGENS

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To create resistant varieties, varieties with high resistance indices are used as sources of the trait. The *purpose* of the research is to determine the sources of resistance to the group of pathogens of wheat leaf diseases among samples of the collection of soft winter wheat varieties.

Materials and methods - 22 varieties of winter wheat of different ecological and geographical origin from 9 countries of the world. Provocative infectious backgrounds of pathogens of powdery mildew (*Blumeria graminis* (DC.) Speer *f. sp. tritici* Marchal. (*Erysiphe graminis* DC. *f.sp. tritici* Marchal) and дыфа rust (*Puccinia recondita f. sp. tritici* Rob. ex Desm (syn. *P. triticina* Erikss) and a natural background of septoria leaf blotch (*Zymoseptoria tritici* (Desm.) syn. *Septoria tritici* Roberge ex Dem.) typical for the Right-Bank Forest-Steppe zone of Ukraine were created. Susceptible wheat varieties to these pathogens were sown with a certain interval between the studied varieties. The damage was recorded in several stages at different phases of plant development according to the method of O.V. Babayants and L.T. Babayants (2014). For the final assessment, the scores of the greatest damage during the records were taken. Results of the work. Group resistance to powdery mildew, leaf rust and septoria leaf blotch was demonstrated by the varieties Dijon, Pam'yati Ghirka, Polysyanka (UKR); Fotima (TUR); Ilona (SVK), Matrix (DEU). Varieties Hvala (UKR) and Figura (POL) are resistant to powdery mildew and septoria leaf blotch, but susceptible to the leaf rust pathogen. Varieties Dyvo, Metelitsa, Laval, Zorepad Bilatserkovskiy, Nasnaga (UKR); Toras (SWE); Manella (NLD); Bodycek (FRA) are resistant to leaf rust and powdery mildew and weakly susceptible to the septoria leaf blotch.

Conclusions. The use of provocative backgrounds makes it possible to determine the resistance potential of collection samples. The involvement of resistant varieties in the breeding process will help to provide future varieties with signs of resistance to local populations of pathogens of powdery mildew, leaf rust and septoria leaf blotch, typical for the Right-Bank Forest-Steppe zone of Ukraine. Growing varieties with a wide range of resistance to pathogens of leaf diseases makes it possible to reduce the use of chemical protection agents and will have a positive impact on the ecological indicators of products and the environment.

Keywords: wheat varieties, resistance, pathogen

STRENGTHENING THE ONE HEALTH CONCEPT BY EXPANDING THE RANGE OF BIOLOGICAL ENTITIES FOR PRESERVING PLANT HEALTH

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The goal is to determine the meaning of the *One Health* concept and to highlight its strengthening elements in order to implement plant health., the concept has established itself and become a fundamental element of public health policies, founding the international journal *One Health* (2019) and fixing the international day of *One Health* on November 3. The concept is based on the notion of ecosystem, which also brings together holistic approaches. We mention that the nominated realities and the expected perspectives, even if they differ according to the mechanisms of interaction, open possibilities for maintaining the ecological balance in the biosphere. The link between biodiversity and health is achieved not only through trends in solving global problems, but also through increased collaboration between specialists in these sectors, as well as the possibility of using the achievements of international investments dedicated to global health.

A comprehensive approach to health in our complex world is essential, which determines the possibility of applying the interaction between the holistic view of the evolution of the biosphere to the human-centered utilitarian approach, which is clearly manifested in the protection of biological diversity and soil health, especially its biota.

The solution of these problems can be achieved only by applying useful organisms, which control in natural conditions the density of populations of phytosanitary agents and contribute to the preservation of plant health. Strengthening the potential for preserving the health of agricultural crops can be achieved by expanding the range of useful microorganisms (viruses, bacteriophages, actinobacteria, antagonistic and entomopathogenic microscopic bacteria and fungi, microscopic algae).

In conclusion, we mention that the achievement of the nominated goals is determined by the need to apply the fundamental principles of *One Health*, because the functionality of the biosphere presupposes the presence of man, fauna, flora and soil with a high degree of health. The scientific community must contribute to the accumulation of information, the development of means and the generation of truly integrative knowledge at the level of human, plant, animal and soil health.

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Keywords: biological preparation, biosphere, biotechnology, ecology, one health.

ANTIFUNGAL ACTIVITY OF A VINYL-TRIAZOLE DERIVATIVE AGAINST *FUSARIUM LATERITUM*

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The fungus *Fusarium lateritium* – an ubiquitous soil fungus pathogen with highly competitive saprophytic property. As a facultative parasite, it can cause root rot and fusarium head blight in various cereal crops, especially in wheat and barley. Root rot can lead to premature loss of tissue viability, causing lodging or wilting of the plants. Because the fungus from the *Fusarium* genus, as other micromycetes, can easily adapt to the chemical substances used in the plant defense system, the investigations concerning the establishment of the new compounds with antifungal properties are very actual, that presented the aim of the carried out research.

Purpose. Establishing the activity of the vinyl-triazole derivative: (z)-1-(2,4-diclorfenil)-3-(piridin-3-il)-2-(1*h*-1,2,4-triazol-1-il)prop-2-en-1-ol against *F. lateritium* phytopathogen.

Methods. The vinyl-triazole derivative was supplemented to the nutrient medium Potato Dextrose Agar (PDA) in the concentrations of: 0,00125; 0,0025; 0,005; 0,01; 0,02 %. Fungal inoculation: a PDA disk with fungal mycelium of 4 mm in diameter in the center of the Petri dish. The cultivation was made at a temperature of 24°C. The colony diameter assessment was done after sowing on the 6-7 – for the fungus – *F. lateritium*.

Results. A high inhibitory effect of the vinyl triazole derivative was noticed in the 7-th day of the experimental research. So, the diameter of the colonies varied in the range of 46,6-89,5% and 64,7-93,6% of the control for the *F. lateritium*-19 and *F. lateritium*-10 strains, respectively.

Conclusion. The high activity of the presented vinyl-triazole compound in rather low concentrations offers good advantages for its use in the wheat plant defense system against the root rot pathogen – *F. lateritium*.

Acknowledgments: This study was supported by the research subprograms 010601 "Chemical study of secondary metabolites from local natural sources and harnessing their applicative potential based on broadening molecular diversity with multiple functionality (MetNatVal)" and 011102 "Expansion and conservation of genetic diversity, improvement of gene pools of agricultural crops in the context of climate change ", financed by Minister of Education and Research.

Keywords: vinyl-triazole, *Fusarium lateritium*, antifungal activity, wheat.

KINETICS OF THE FERMENTATION PROCESS OF BREAD DOUGH USING LOCAL YEAST CULTURES

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The bread and bakery industry in the Republic of Moldova is a key economic sector, with an average annual consumption of 112-115 kg of bread and bakery products per capita. This growing demand drives the need for industrial yeast, which is currently imported. Consequently, developing domestic yeast production, especially by identifying and selecting of local *Saccharomyces cerevisiae* strains with improved fermentative performance, is a strategic opportunity.

This study analyzed 9 local isolates of *Saccharomyces cerevisiae* and two industrial reference preparations widely used in the global baking industry (O-Tentic Durum, Spring Pane). Gas formation capacity (volume) was measured at 0, 20, 40, and 60 minutes, and fermentation indices and enzymatic activity also monitored.

Five local isolates demonstrated high fermentative performance, with gas formation volumes comparable to the reference preparations. At the start of the investigation, the initial gas volume in all samples was 0.6 cm³. After 20 minutes, the values ranged from 0.8 to 1.4 cm³; after 40 minutes, from 1.0 to 2.2. cm³; and after 60 minutes, from 2.2 to 4.0 cm³.

These results confirm the potential of using local yeast strains in the baking industry, offering a viable alternative to imported products and supporting the development of domestic production capacity.

Acknowledgments: This study was supported by the Research Subprogram 020101 "InBioS - Innovative biotechnological solutions for agriculture, medicine and environment".

Keywords: *Saccharomyces cerevisiae*, local isolates, fermentative activity, gas formation capacity, biotechnological selection.

IDENTIFICATION OF MICROMYCETE STRAIN WITH STIMULATORY POTENTIAL FOR AGRICULTURAL PLANTS

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Population growth requires sustainable agricultural solutions based on high productivity and respect for the principles of the circular economy. Beneficial microorganisms, especially filamentous fungi such as *Trichoderma*, play an essential role in maintaining soil health, solubilizing phosphorus and adapting plants to difficult conditions (drought, salinity). The genus *Trichoderma* is particularly valuable in agriculture, having antifungal effects, stimulating plant growth and improving soil structure. It reduces dependence on chemical pesticides by providing an environmentally friendly alternative. Filamentous fungi, especially the *Trichoderma* genus, have high potential as biofungicides. Research of *Trichoderma* strains and optimization of cultivation conditions are crucial for obtaining metabolites with effective antimicrobial activity.

The purpose of the research was to select the optimal cultivation environment for the *Trichoderma longibrachiatum* strains.

To select the optimal submersible cultivation environment of *Trichoderma longibrachiatum*, three different nutrient media containing: mineral salts and supplements: corn extract (M 1); beet molasses (M 2); yeast extract (M 3) were tested. These averages were assessed according to their ability to support fungal growth and the production of bioactive metabolites with antimicrobial potential, reflecting various conditions of availability of essential nutrients. Strain *Trichoderma longibrachiatum* was cultivated for 7 days at 28-30°C with continuous shaking. The filter-derived metabolites were tested against six phytopathogens at intervals of 3-7 days using the agar diffusion method.

The three nutrient media tested differently influenced the antifungal activity of the *Trichoderma longibrachiatum* strain. Metabolites obtained when growing the strain in the environment Environment M1 (corn extract) demonstrated the highest efficiency, with maximum antifungal activity obtained after 4 days of cultivation (inhibition areas: 27.7-41.7 mm), those in the environment M2 (beet molasses) had a lower activity, even after 7 days of cultivation and the metabolites in the M3 medium (yeast extract) showed progressive activity with maximum efficiency at day 6 (28-35 mm inhibition areas). Due to its nutrient-rich content, which stimulates the production of antifungal compounds, the M1 medium has been selected as optimal for submerged cultivation of the *Trichoderma longibrachiatum* strain.

Acknowledgments: This study was supported by the research project National Scholarship programme of the World Federation of Scientists.

Keywords: Fungi, sustainable agriculture, nutrient media.

RESEARCH OF WHEAT PEROXIDASE ISOZYMES IN CONNECTION WITH RESISTANCE TO BARLEY YELLOW DWARF VIRUS

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Wheat (*Triticum aestivum* L.) is the most economically important crop in Ukraine. The one of the factors limiting the productivity of wheat is viral diseases, in particular Barley yellow dwarf virus (BYDV). Three resistance genes have been identified for BYDV, namely *Bdv1*, *Bdv2*, *Bdv3* and *Bdv4* (Alquicer et al., 2023). Isozymes are biochemical markers for genetic studies of plants. Since isoenzymes are direct products of genes, their electrophoretic spectra (zymograms) can be effectively correlated with the genetic composition of a particular genotype (Karaca, 2013). Peroxidase (EC 1.11.1.7) is a part of the enzymatic antioxidant system of plants and has the ability to respond to any environmental stresses by changing the sets of isozymes and/or the expressivity of individual isoforms of this enzyme (Pandey et al., 2017). Thus, the goal of our research was to study the peroxidase isozymes of wheat in connection with resilience to BYDV.

The six-day-old seedlings of recombinant introgression lines of winter bread wheat, obtained as a result of hybridization of a primary introgression line with *ph1b*-mutant of the cultivar ‘Chinese Spring’, amphidiploids and wheat cultivars differing in the level of resilience to BYDV and the presence or absence of the *Bdv1* gene were used in the research. Electrophoretic spectrum of wheat peroxidase are represented by 10-13 isoforms of different mobility and expressivity. All the investigated genotypes were different by the electrophoretic spectrum of enzyme. It was established that the presence of three individual isoforms and the expressivity of some peroxidase isoforms correlates with resistance to BYDV and the presence of the *Bdv1* gene. These results broaden the understanding of adaptive strategies of wheat involving peroxidase isoforms and provides a foundation for discussions and actions aimed in controlling viral plant pathogens, in particular BYDV.

Acknowledgments: This study was supported by the research project 2023.03/0244. “Mechanisms controlling of resilience of economically important crops to viral diseases under war conditions and global warming, funded by the National Research Fund of Ukraine.

Keywords: wheat, resistance, Barley yellow dwarf virus, peroxidase isozymes.

TESTING OF NATURAL COMPOUNDS AS SYNERGISTS OF THE SYNTHETIC SEX PHEROMONE OF THE CODLING MOTH *CYDIA POMONELLA*

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The codling moth (*Cydia pomonella* L.) is one of the most destructive pests of fruits such as apples, pears, walnuts, and quinces; and chemical treatments have caused the emergence of insecticide resistance. Traditionally, synthetic sex pheromones are used to interrupt mating in order to suppress the population. A strategy to increase attractiveness is the use of combined attractants based on synthetic sex pheromones and synergists, in the form of volatile plant substances.

The combined attractant testing was carried out under open field conditions in an apple orchard known to be infested with *C. pomonella* L. Standard pheromone traps (E8, E10-C12-OH) served as a control. The experimental traps contained the same standard mixture with the addition of volatiles (3 experimental variants). Trap catches were monitored regularly (once every 3 days) and the number of male moths captured in each trap was recorded. Each treatment was replicated three times. The number of male moths captured in each trap was recorded and the average catch per trap was calculated.

The number of insects captured increased in all experimental combinations by 88%, 69% and 60%, respectively, compared to the standard pheromone, indicating that the addition of volatile compounds increased the effectiveness of the standard pheromone. And the difference in the number of males captured allowed the selection of a volatile compound for the purpose of further research, related to its dosage.

These results confirm existing scientific data that volatile compounds enhance the effectiveness of the standard pheromone by modifying the behavior of the codling moth.

Acknowledgments: This study was supported by the Subprogram 0111013: “Elaboration of ecologically harmless means of reducing the impact of harmful organisms of agricultural crops against the background of climate change”, for 2024-2027, funded by the Ministry of Education and Research of the Republic of Moldova.

Keywords: *Cydia pomonella* L., biological efficiency, codling moth, sex pheromone, minor component.

SOURCES OF ECONOMICALLY VALUABLE TRAITS FOR BRASSICA RAPA L. VEGETABLES CROPS BREEDING

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Vegetable crops of *Brassica rapa* L. compose an integral part of the world economy, providing fresh vitamin products for humanity. They are actively cultivated in East Asian countries for various purposes: food, medical, cosmetic and decorative. In Russia, most of them belong to the local non-traditional crops, but the interest of the population to these crops is increasing due to their valuable biochemical composition, high yield and simplicity of cultivation.

The aim of the study: to identify the source material in terms of economically valuable traits in the VIR *Brassica rapa* L. crops world-wide collection for use in the breeding process.

The material of the study included 23 accessions of the species belonging to different botanical and ecological-geographical groups: Chinese cabbage - 7 accessions, pak-choi - 2, tacai - 1, mizuna - 1, leaf turnip - 1 and root turnip - 11. The field study was carried out on the basis of NPB «Pushkin and Pavlovsk laboratories of VIR» (St. Petersburg, North-West region of the Russian Federation) in 2024 with the use of VIR Methodic guidelines for the study and maintenance of the world cabbage collection (1988), Methodic of the State cultivar testing of agricultural crops, assessment of the degree of *Alternaria* spp. - according to the Methodic of F.B. Gannibal (2011), biochemical analysis - according to the Methodics of the VIR Department of Biochemistry (Ermakov et al., 1987).

As a result of the study, valuable accessions with a complex of economic, phytopathologic and biochemical traits were identified, representing promising source material for breeding programs aimed at expanding the range of vegetable crops.

Acknowledgments: *The research is carried out by the state assignment topic number FGEM-2022-0003 «World resources of vegetable and cucurbits crops of the VIR collection: effective ways to reveal the ecological and genetic regularities of formation of diversity of use of breeding potential».*

Keywords: *Brassica rapa* L., genetic diversity, breeding value, *Alternaria* spp., sources of resistance for breeding

MORPHOMETRIC SEED VARIABILITY IN WINTER TWO-ROWED BARLEY UNDER DIFFERENT GROWING CONDITIONS

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Winter two-row barley seed quality directly influences malting efficiency and, consequently, the quality of the final product. The objective of this paper is to assess the yield and seeds morphometry of ten winter two-rowed barley varieties and advanced lines tested under both fertilised conditions (100 kg Urea/ha-1) and unfertilised conditions in the climatic context of 2023-2024 in south-east Romania.

The seeds' morphometry was determined using the Marvin analyser (multispectral camera) developed by Marvitech, which enables rapid and precise measurement of seed dimensions: length, width, and thickness through high-resolution digital image analysis. Plumper grains contain more starch, leading to higher extract yields during malting and brewing. Thin or shrunken grains often have higher husk-to-endosperm ratios and contribute to poor malt quality. Additionally, seed size diameter (as a percentage of seeds > 2.5 mm) was determined using Sortimat.

Morphometric traits of the seeds differed under the studied growing conditions. The proportion of seeds larger than 2.5 mm varied from 52.29% to 97.38%. Seed area ranged from 17.05 mm² to 22.17 mm², while circularity values ranged from 1.43 to 1.87. Seed width varied between 3.20 mm and 3.73 mm, and length ranged from 8.55 mm to 9.42 mm. The length-to-width ratio also showed variation, ranging from 6.99 to 9.42.

BIOFERTILIZERS IN SUNFLOWER (*HELIANTHUS ANNUUS* L.) CULTIVATION: STRAINS, EFFECTS, AND APPLICATIONS

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Modern studies confirm that biofertilizer inoculants can play a valuable role in sunflower cultivation. *Azospirillum* and *Azotobacter* enhance nitrogen nutrition and hormone-driven growth, improving height, seed number, and yield. Fungi AMF (Arbuscular Mycorrhizal) symbiosis boosts P and water uptake, particularly under drought. PSB (Phosphate-Solubilizing Bacteria) strains increase P (phosphorus) availability and stress resilience. When applied appropriately (e.g. as seed or soil inoculants), these biofertilizers can increase sunflower yields by roughly 10–25% on average (with some reports much higher), while reducing fertilizer requirements. Their effects on seed quality (oil content and nutrients) are also positive. Farmers should choose strains suited to local soil–climate conditions and use recommended dosages (typically on the order of 10^7 – 10^9 CFU per seed or per kg soil). Ultimately, integrating biofertilizers with reduced chemical fertilizers and organic amendments can sustainably enhance sunflower production and stress tolerance.

Keywords: *biofertilizer, Azospirillum, Azotobacter, Arbuscular Mycorrhizal, Phosphate-Solubilizing Bacteria.*

INFLUENCE OF NATURAL BIOREGULATOR JS ON STARCH CONTENT CONSUMED DURING CORN SEEDS GERMINATION

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The process of corn seeds germination is a very important physiological phase in agronomy, as it determines the further development of the plants and, eventually, the yield. In recent times, the attention of scientists and agronomists has been attracted to the influence of natural bioregulators on seed metabolism, in particular, on the consumption of starch, which serves as the main energy resource in the initial stage of development. The extract from aerial parts of the plant *Juniperus sabina* L. (JS) has previously been tested as a growth bioregulator and has demonstrated a stimulating effect on beech seeds germination. The purpose of this work was to study the effect of different concentrations of natural bioregulator JS on starch used during corn seed germination, and correlation between starch mobilization and root/seedlings vigour.

Three concentrations of JS 0.01, 0.001, 0.0001% were applied for corn seeds treatment before germination. The bioregulator JS contains active compounds that may stimulate biochemical pathways involved in the mobilization of starch, in comparison with seeds treated by water (control). The starch content in seeds were analyzed using the Evers polarimetric method. Seeds of pop-corn hybrid Porumbeni 390 (P390) with initial starch content $65.22 \pm 0.66\%$ were used in experiments. The starch content decreased during germination, and in the JS treatment variants this was greater than in the control seeds, which used to germinate only 2.40% of the initial starch. The maximum consumption of starch (4.23%) was determined in corn seeds treated with concentration of 0.0001% that correlated with increasing of root/seedling growth and their vigour. The roots vigour obtained from seeds treated with 0.0001% JS improved by 16.35% that is very important for plant rooting at the initial phase of growth. Higher concentrations of JS - 0.01, 0.001% had minimal effect on starch mobilization with results of 1.25% and 2.19% respectively as these concentrations of JS acted as inhibitors of corn seed germination. Therefore, the dosage of natural bioregulators should be tested in advance.

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Keywords: bioregulator, corn seed, germination, *Juniperus sabina*, starch content.

THE ROLE OF SOME RECEPTOR-LIKE KINASES IN EARLY ANTHOR DEVELOPMENT IN SUNFLOWER

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Cell-to-cell communication is essential for the differentiation of cell types during plant ontogenesis and for adaptation to environmental changes. Male reproductive development, in particular, requires tightly coordinated signaling between the different cell layers of the anther. The tapetum, a somatic layer adjacent to developing male meiocytes, plays a crucial role in microsporogenesis by secreting nutrients, enzymes, and developmental signals. Defects in tapetal development often result in male sterility.

Receptor-like kinases (RLKs), located on the plasma membrane, mediate the perception of extracellular cues and trigger intracellular signaling pathways essential for developmental responses. The *EMS1* (*Excess Microsporocytes1*) gene is the first identified RLK with a defined role in specifying the fate of tapetal and microsporocyte cells during early anther development. *EMS1* is highly expressed in anther sporogenous and parietal cells. When the function of *EMS1* is disrupted, the anther has no tapetal layer, but instead presents excess microsporocytes.

In *Arabidopsis*, *EMS1* interacts with and is transphosphorylated by *SERK1* (SOMATIC EMBRYOGENESIS RECEPTOR-LIKE KINASE1), a process necessary for *EMS1* activation. The *SERK1* also encodes an LRR-RLK protein and redundantly regulates the tapetum development with its homologous protein *SERK2*.

How plants sense and respond to changing environmental factors, especially during microsporogenesis, remains a challenging biological question. While RLKs have been extensively studied in *Arabidopsis*, their homologs in crop species like sunflower remain largely uncharacterized, particularly in the context of reproductive development. In sunflower, most existing RLK-related studies have focused on responses to biotic and abiotic stress, such as the involvement of *HaOr7* RLK in resistance to the parasitic plant *Orobanche cumana*.

This study aimed to analyze the expression patterns of selected candidate RLK genes during four stages of microsporogenesis in fertile sunflower anthers (line SW501). Total RNA was extracted, cDNA synthesized, and gene expression quantified using RT-qPCR.

The results revealed stage-specific expression patterns of RLK genes, indicating their potential involvement in early anther development, particularly during microsporogenesis in sunflower.

Acknowledgements: This research was supported by the subprogram 011101 Genetic and biotechnological approaches to the management of agroecosystems in the conditions of climate change, funded by the Ministry of Education and Research.

Keywords: anther development, *Helianthus annuus*, microsporogenesis, receptor-like kinases, gene expression.

BIOCHEMICAL EVALUATION OF BLACK AND BROWN SOYBEAN GENOTYPES

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Soybean (*Glycine max*) is one of the most important grain crops, holding substantial economic value across the globe. This legume is a primary source of high-quality plant protein (40 %) and vegetable oil (20 %), making it essential for both human consumption and livestock feed. With its remarkable adaptability to different growing conditions, soybean cultivation is a major agricultural in many countries, contributing significantly to economic development and food security worldwide.

Variation in biochemical composition among different varieties enhances genetic screening of kernel traits and grain quality attributes, contributing to a breeding strategy to enhance grain composition. The main objective of this work was to evaluate the whole kernel biochemical composition of tree black and two brown soybean genotypes developed at Maize Research Institute Zemun Polje. Phytochemical characterization was performed for total protein, sugar, oil content, and fatty acid composition, including palmitic, stearic, oleic, linoleic, and linolenic acids. The analysis revealed that the total protein content ranged between 36.44% and 38.48%, indicating a consistent protein level across samples. Additionally, the sugar content was found to vary from 2.59 g/100g to 3.63 g/100g. Furthermore, the oil content demonstrated a minimum value of 20.23% and a maximum of 22.38%, reflecting oil composition. The most abundant fatty acid was linoleic acid, with a range from 53.46 g/100g to 56.15 g/100g, followed by oleic acid, with a detected range from 21.35 g/100g to 24.25 g/100g. A significantly lower level of palmitic, linolenic, and stearic acids was observed, ranging from 9.57 g/100g to 11.51 g/100g, 5.42 g/100g to 7.18 g/100g, and 3.73 g/100g to 5.86 g/100g, respectively.

Our findings will provide valuable insights for breeders and agricultural researchers focused on improving soybean quality and enhancing food security.

Acknowledgments: This study was supported by the research project of the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Grant No. 451-03-136/2025-03/200040).

Keywords: *Glycine max*, protein, oil, sugar, fatty acids.

EXPLORING THE THERAPEUTIC POTENTIAL OF *CORIANDRUM SATIVUM* ESSENTIAL OIL IN MITIGATING COGNITIVE IMPAIRMENT AND OXIDATIVE STRESS: INSIGHTS FROM A ZEBRAFISH MODEL

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Alzheimer's Disease (AD) is a progressive neurodegenerative disorder characterized by cognitive decline and memory loss. Environmental neurotoxins such as aluminum chloride (AlCl₃) and lead acetate (AcPb) have been implicated in the development and progression of AD.

This study aimed to establish a novel experimental model of AD in zebrafish (*Danio rerio*), induced by chronic exposure to these heavy metals.

Zebrafish were exposed for 21 days to sublethal concentrations of AlCl₃ (50, 200, and 500 µg/L), AcPb (50, 200, and 500 µg/L), as well as a combination of AlCl₃ and AcPb (200 µg/L each). To assess neurotoxic effects, behavioral tests including the Y-maze for spatial memory and the novel object recognition (NOR) test for recognition memory were performed. Anxiety-related behavior was evaluated using the novel tank diving test (NTT). In addition to behavioral assessments, biochemical analyses measured oxidative stress markers and acetylcholinesterase (AChE) activity in brain tissue.

Results indicated that combined exposure to AlCl₃ and AcPb caused significant cognitive deficits and increased anxiety-like behavior in zebrafish. Biochemical analyses revealed elevated oxidative stress and altered AChE activity, consistent with neurodegenerative processes.

This experimental model provides a valuable tool for investigating the role of environmental factors in AD pathology and for testing potential neuroprotective therapies.

Keywords: *Alzheimer's disease, zebrafish, aluminum chloride, lead acetate, neurotoxicity, cognitive deficits, oxidative stress.*

THE EFFECT OF ANTIVIRAL DRUGS RIMANTADINE AND ARBIVIR ON THE IMPROVEMENT OF POTATO VARIETIES

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The aim of the research was to develop and optimize effective methods for improving the quality of seed potatoes of new varieties and increasing their reproduction rate using virus-inhibiting substances (Arbivir, Rimantadin).

Meristem isolation was carried out according to the generally accepted method aseptically from the apex of the cone of growth of etiolated shoots in a laminar box.

The lines obtained after the first passage were tested for the content of virus antigens by enzyme-linked immunosorbent assay (ELISA). Based on the results, the lines with the lowest optical density of the enzymatic reaction product were selected. Recovery of regenerated plants from viral infection was carried out with the addition of antiviral drugs Rimantadine and Arbivir at a concentration of 50 mg/l to the M-C nutrient medium.

When using the antiviral drug Rimantadin, a stimulating effect on plant regeneration was found. Thus, in the Zhytnytsia variety, the number of roots was 4.75 pcs, and their length was 41.6 mm, which is 0.42 pcs and 1.8 mm more than in the control. The height of the plants was 28.7 mm, which is 2.2 mm higher than the control, the number of internodes was at its level. In the Slouta variety, the number of roots was 3.79, and their length was 37.2 mm, which is 0.15 and 1.3 mm more than in the control, the number of internodes was 3.12, which is 2.5 cm above the control, the height of the plants was 32.3 mm and was at its level. In the variety Mystery, all indicators, except for root length, were at the level of the control.

The antiviral drug Arbivir, on the contrary, inhibited the growth and development of plants of all studied varieties. Indicators of the number and length of roots, plant height and number of internodes were lower than in the control. It was found that Rimantadine, at a concentration of 50 mg/l, has a stimulating effect on the growth and development of regenerated plants of the improved lines of Zhytnitsa, Slauta, and Mysteriya varieties.

The antiviral drug Arbivir, at a concentration of 50 mg/l, inhibited the morphogenesis of potato plants of Zhytnytsia, Slauta and Mysteriya varieties.

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Keywords: regenerative plants, viruses, antiviral drugs.

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Session D

APPLIED PHYSICS AND EMERGING TECHNOLOGIES

INFLUENCE OF NANOSTRUCTURING PROCESS ON CORROSION BEHAVIOR OF Zr1%Nb AND Zr2.5%Nb ALLOYS FOR BIOMEDICAL APPLICATIONS

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Biomaterials require high mechanical strength, excellent corrosion resistance, and biocompatible alloying elements. Commercial Zr-Nb alloys, commonly used as nuclear fuel cladding due to their superior corrosion resistance in diverse environments and moderate mechanical strength, are promising candidates for biomedical implants. However, their application necessitates strength enhancement without compromising corrosion resistance or ductility, prompting the use of Equal Channel Angular Pressing (ECAP). This process simultaneously refines grain structure and induces phase transformations, altering ionic and electronic conductivity. Grain refinement increases ionic pathways via grain boundaries while reducing grain size elevates electrical resistance. Since corrosion behavior fundamentally depends on electrochemical charge transfer maintaining post-ECAP corrosion resistance is critical.

This study analytically compares the corrosion properties of Zr1%Nb and Zr2.5%Nb alloys before and after ECAP in physiological fluids, assessing the impact of ECAP regime. Thus, Cyclic potentiodynamic polarization tests in chloride-containing Ringer's solution were conducted using a three-electrode cell and an IPC-Pro 3A potentiostat with IPC-2000 software for monitoring.

Results showed that all specimens exhibited passivation at low potentials and pitting corrosion with hysteresis loops at higher potentials. Pitting initiated at 0.6 V and 0.4 V for Zr1%Nb and Zr2.5%Nb, respectively. Notably, only pre-ECAP Zr1%Nb demonstrated repassivation capability at 0.42 V. ECAP reduced grain size by 88% and dissolved β -Nb precipitates into the α -Zr matrix, forming a supersaturated solid solution. The grain refinement decreased corrosion rates (current density) by 88% for Zr1%Nb and 27% for Zr2.5%Nb, but despite this, ECAP-induced phase transformation led to the formation of a less protective thin oxide film in both alloys. The protective properties of the oxide film on Zr1%Nb were the most significantly affected by ECAP dual effects, losing its repassivation capability.

The obtained results revealed that post-ECAP Zr1%Nb suffered a significant corrosion resistance degradation, while Zr2.5%Nb exhibited only minor effects.

Acknowledgments: This study was supported by research Subprogram 011201 of the IAP USM, funded by the Ministry of Education and Research of Moldova Republic.

Keywords: Zr1%Nb, Zr2.5%Nb, ECAP, Ringer solution, pitting corrosion, cyclic potentiodynamic polarization test, strain- induced phase transformation, grain refinement.

HETEROMETALLIC OCTANUCLEAR Co-Ln NANOCCLUSERS BASED ON TRIETHANOLAMINE AND PIVALATE LIGANDS

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In recent decades, nanoscale homo- and heterometallic coordination clusters based on magnetic transition metal and/or lanthanide ions have garnered significant attention due to their considerable potential in the production of the next generation of functional materials with a broad range of applications in various fields. These include magnetic sensors, new spintronic devices, and magnetocaloric refrigerants, catalysis, energy materials and others. A series of new heterometallic octanuclear cluster compounds with the general formula $[\text{Co}_4\text{Ln}_4(\text{OH})_6(\text{Htea})_4(\text{piv})_8(\text{CHO}_2)_2] \cdot n\text{H}_2\text{O}$ ($\text{Ln} = \text{Gd}$ (1), Tb (2), Dy (3), Ho (4), and Er (5), $\text{Hpiv} = \text{pivalic acid}$, $\text{H}_3\text{tea} = \text{triethanolamine}$) have been prepared and characterized by elemental analysis, IR spectroscopy and ESI-MS spectrometry. X-ray structural analysis shows that compounds **1-5** are isostructural and crystallize in the tetragonal $P-42m$ space group. The nanoclusters comprise four Co(III) and four Ln(III) ions, whose charge is compensated by eight deprotonated piv^- and four Htea^{2-} ligands, four $\mu_3\text{-OH}^-$ groups bonded to three metal atoms, two $\mu_2\text{-OH}^-$ groups, and two deprotonated formate CHO_2^- moieties (Fig. 1). In the structure of all compounds, the Ln(III) atoms occupy the vertex of an exactly planar square, while the Co(III) atoms are situated at the vertex of a flattened tetrahedron, and are displaced from the plane of the lanthanide atoms by about 1 Å in opposite directions.

Acknowledgments: This study was supported by the subprogram 011202 financed by the Ministry of Education and Research of R. Moldova and the research project “MultiClust” financed by the German Federal Ministry of Education and Research (BMBF) and the National Agency for Research and Development (NARD).

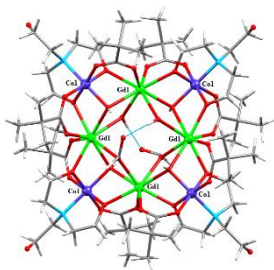


Fig. 1. Structure of cluster 1.

Keywords: cobalt, lanthanide, coordination compound, X-ray diffraction.

PENTANUCLEAR COBALT(II,III) CLUSTER WITH PIVALATE, TRIETHANOLAMINE AND AZIDE LIGANDS

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In recent years, there has been a significant increase in research focused on polynuclear compounds that contain mixed-valence paramagnetic metal centers. This area of research has attracted considerable attention due to the potential of these compounds to manifest magnetic interactions, as well as their promise for application in the development of molecule-based magnetic materials. As a part of our ongoing research in elaborating magnetic cobalt-containing complexes, a new pentanuclear mixed-valent $[\text{Co}_5(\text{piv})_2(\text{Htea})_4(\text{N}_3)_4] \cdot \text{MeCN} \cdot \text{H}_2\text{O}$ (**1**) cluster has been synthesized by the reaction of cobalt(II) pivalate (Hpiv = pivalic acid) with NaN_3 and triethanolamine (H_3tea) in MeCN. Single crystal X-ray structural analysis reveals that **1** crystallizes in the monoclinic $P2_1/c$ space groups with unit cell parameters: $a = 14.0911(8)$, $b = 17.1136(6)$, $c = 22.9576(9)$ Å, $\beta = 100.317(4)^\circ$. The core of the cluster contains one central Co^{II} ion and four peripheral Co^{III} ions. The Co^{III} ions are bounded in two identical pairs by a pivalate ligand and two Htea^{2-} ligands. Such pairs are connected with the central Co^{II} atom via the bridging function of oxygen atoms of four Htea^{2-} ligands, resulting in its tetrahedral surrounding. Azide ions coordinate to the peripheral Co^{III} atoms and complete their coordination environment to octahedral (Fig. 1a). The Hirshfeld surface analysis and fingerprint plots were used to explain the intermolecular interactions in **1** (Fig. 1b).

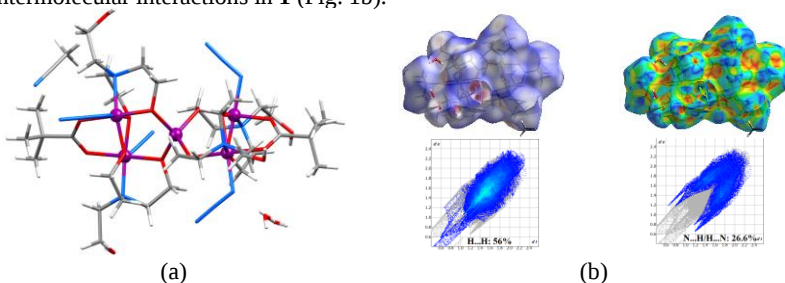


Fig. 1. The crystal structure and HS analysis over d_{norm} and shape index for **1**.

Acknowledgment: The authors are grateful for the subprogram financed by the Ministry of Education and Research of R. Moldova 011202.

Keywords: cobalt, pentanuclear compound, X-ray, pivalate, triethanolamine.

OPTICAL PROPERTIES OF INGAN-BASED LIGHT-EMITTING DIODES

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We report on a numerical study of optical properties for InGaN-based light-emitting diodes (LEDs) on polar c-plane (0001) and semipolar (11 $\bar{2}$ 2), (11 $\bar{2}$ 1), and (10 $\bar{1}$ 2) substrates. InGaN is considered crucial for light-emitting diodes (LEDs) because it enables efficient light emission across the visible spectrum, particularly in the blue and green regions.

The LED device model could be described through the numerical solution of the Schrödinger-Poisson system combined with the drift-diffusion equation. The time-independent Schrödinger equation within effective mass approximation can be expressed as follows:

$$\left\{ -\frac{\hbar^2}{2} \left(\nabla \cdot \frac{\nabla}{m^{\wedge*}} \right) + U \right\} \Psi = E \Psi, (1)$$

where E is the energy, $U(x) = -q\phi(x) + \Delta E_c(x)$ is the potential energy, $m^{\wedge*}$ is the effective mass tensor, Ψ is the wave function, and $\hbar$ is the reduced Planck constant.

The Poisson equation for the electrostatic potential ϕ , which includes both spontaneous and piezoelectric polarization effects, is expressed as:

$\nabla \cdot (P^{tot} - \epsilon_0 \epsilon^{\wedge} \nabla \phi) = q(N_D^+ - N_A^- + p - n), (2)$ where P^{tot} represents the total polarization from both spontaneous and piezoelectric sources, ϵ_0 is the permittivity of free space, $\epsilon^{\wedge}$ is the material permittivity, n is the electron concentration, p is the hole concentration, and N_D^+ and N_A^- are the densities of ionized donors and acceptors, respectively. The equations (1-2) were solved self-consistently using the one-dimensional Schrödinger-Poisson solver software 1D-DDCC.

Our simulations show that the performance of the LEDs on semipolar substrates is superior to that of the conventional LED on a polar c-plane substrate due to the reduced impact of polarization effects in semipolar devices. At a current density of 100 A/cm² the wall-plug efficiencies of 11.5% and 14.7% were achieved for the LEDs on polar c-plane (0001) and semipolar (10 $\bar{1}$ 2) substrates, respectively.

Acknowledgments: Authors acknowledge financial support from the Moldova Government (research program 011208).

Keywords: light-emitting diodes, external quantum efficiency, InGaN.

SYNTHESIS AND CRYSTAL STRUCTURE OF A NEW Zn(II) METAL-ORGANIC COMPOUND WITH THE BENT DITOPIC 4,4'-DIAMINODIPHENYLMETHANE LIGAND

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The analysis of the Cambridge Structural Database and the literature sources, highlights the versatile capacity of the Zn(II) ion to form a wide variety of coordination compounds, in particular due to its d^{10} configuration and the lack of a strict preference for a certain geometry. Zinc is frequently coordinated with polydentate ligands or N,O-type heteroatom donors, forming mono-, bi- or polynuclear complexes, with notable applications in supramolecular chemistry and biomedicine. A relevant example is the use of the bidentate 4,4'-diaminodiphenylmethane (dadpm) chromophore, which binds to the Zn(II) ion in a monodentate or bidentate manner, as neutral ligand. The new coordination compound $[\text{Zn}(\text{dadpm})_2(\text{H}_2\text{O})_2(\text{NO}_3)_2]$ was obtained by the reaction of Zinc(II) nitrate hexahydrate salt with the ditopic dadpm chromophore in a MeCN/EtOH solvent mixture. The given mononuclear neutral complex crystallizes in the triclinic space group $P\bar{1}$: $a=5.8280(4)$, $b=9.4594(7)$, $c=13.4622(10)$ Å; $\alpha=105.687(7)$, $\beta=98.242(6)$, $\gamma=105.776(6)^\circ$, $V=668.50(9)$ Å³. The Zn(II) cation is located on an inversion center and adopts a slightly distorted octahedral geometry with the set of N_2O_4 donor atoms, originating from pairs of dadpm and aqua neutral ligands, and the nitrate anions, the identical ligands coordinate the Zn(II) metal in the *trans*-positions.

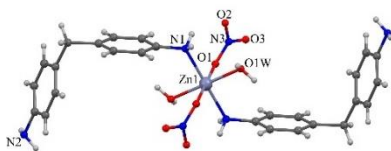


Fig. 1. Structure of $[\text{Zn}(\text{dadpm})_2(\text{H}_2\text{O})_2(\text{NO}_3)_2]$

For the obtained coordination compound, some physicochemical analyses were carried out to confirm the structure, the infrared spectroscopy confirmed the presence of the ligands. The distribution of intermolecular

interaction was evaluated using Hirshfeld surface analysis.

Acknowledgments: Subprogram 011202 "Design and fabrication of intelligent materials with advanced magnetic, adsorption, luminescent and biologically active properties", financed by the Ministry of Education and Research of R. Moldova.

Keywords: 4,4'-diaminodiphenylmethane (dadpm), coordination compound, X-ray study.

TRENDS AND CHALLENGES IN THE SYNTHESIS AND CHARACTERIZATION OF DOPED NiO THIN FILMS

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Nickel oxide (NiO), a p-type semiconductor with a wide bandgap (3.6–4.0 eV), is widely used in electrochromic and photovoltaic devices due to its chemical stability and high transparency. However, undoped NiO exhibits limited conductivity restricting its performance. This study investigates the influence of doping with both monovalent (Cu^+ , Ag^+ , Na^+) and trivalent (Ga^{3+} , In^{3+} , La^{3+}) elements on the structural, morphological, and optical properties of NiO thin films prepared by Metalorganic Aerosol Deposition (MAD).

MAD enables precise control over dopant concentration and allows for a single-step deposition from a homogeneous precursor solution using dimethylformamide as solvent for respective acetylacetonate precursor. By adjusting parameters such as dopant atomic content in solution (0.5–6.0 at.%) and substrate temperature (400–650 °C), NiO thin films with tailored properties were obtained. Structural analysis via Grazing Incidence X-ray Diffraction (GI-XRD) revealed rock-salt NiO with tailoring lattice parameters. Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM) confirmed nanocrystalline morphology with surface roughness and grain size dependent on dopant type and growth conditions.

Compositional analysis by Energy Dispersive Spectroscopy (EDS) and X-ray Photoelectron Spectroscopy (XPS) showed homogenous composition for all films. Optical characterization via ellipsometry highlighted improved transmittance and optical bandgap tunability, essential for device integration. The structural and compositional analysis demonstrate the technological potential of MAD for engineering functional NiO layers suitable for chromogenic and optoelectronic applications.

Acknowledgments: This study was supported by the research subproject *Abundant-element-based materials and structures for radiation detection and efficient energy conversion (#011207 DETCONV)* funded by Ministry of Education and Research of Republic of Moldova and the bilateral project *DUALCHROM*, 18ROMD/20.05.2024, România-Moldova funded by CNCS-UEFISCDI

Keywords: Metalorganic Aerosol Deposition, electrochromism, nickel oxide.

HYDRAZIDE-DIRECTED ASSEMBLY IN A ZN(II) COORDINATION POLYMER: CRYSTALLOGRAPHIC AND HIRSHFELD SURFACE STUDY

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4-Aminobenzoic acid hydrazide (4-ABAH), a bifunctional molecule featuring both amino and hydrazide moieties, has been employed predominantly as a synthetic intermediate toward hydrazine-based derivatives with reported antimicrobial, antitubercular, and anticancer properties. Despite its chemical versatility, a survey of the Cambridge Structural Database reveals only three structurally characterized metal complexes incorporating 4-ABAH, underscoring its underexplored potential as a ligand in coordination chemistry.

Herein, we report the crystal structure of the Zn(II) coordination polymer, $\{[\text{Zn}(\text{4-ABAH})_2]\text{SiF}_6 \cdot 2\text{H}_2\text{O}\}_n$, which crystallizes in the monoclinic space group $P2_1/c$. The Zn(II) center exhibits a distorted square pyramidal geometry ($\tau = 0.52$), defined by an N_3O_2 donor set derived from three neutral 4-ABAH ligands. Notably, one ligand coordinates in a bidentate-chelating mode, while the remaining two adopt a bridging tridentate mode, thus propagating a one-dimensional cationic coordination polymer. The charge balance is maintained by discrete $(\text{SiF}_6)^{2-}$ anions that participate in a network of $\text{O} \cdots \text{H} \cdots \text{F}$ hydrogen bonds with lattice water molecules and coordinated carbonyl moieties along the polymeric chain (Figure 1). The supramolecular architecture is further reinforced by π - π stacking interactions between aromatic rings of adjacent ligands, contributing to the overall stabilization of the crystal lattice. A detailed Hirshfeld surface analysis indicates that $\text{H} \cdots \text{H}$ contacts dominate the intermolecular interaction landscape, highlighting their significant role in directing crystal packing.

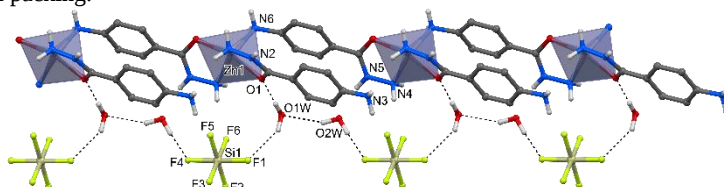


Figure 1. 1D coordination polymer of $\{[\text{Zn}(\text{4-ABAH})_2]\text{SiF}_6 \cdot 2\text{H}_2\text{O}\}_n$

Acknowledgments: This study was supported by the research project "Design and fabrication of smart materials with advanced magnetic, adsorption, luminescent and biologically active properties" (code 011202).

Keywords: 4-Aminobenzoic acid hydrazide, crystal structure, coordination polymer.

HETEROMETALLIC {Fe₅Ln₄} PIVALATE CLUSTERSPodgornii Daniel¹, ORCID: 0000-0002-8040-7403Jan van Leusen², ORCID: 0000-0003-3688-631XKögerler Paul², ORCID: 0000-0001-7831-3953Kravtsov Victor¹, ORCID: 0000-0002-1955-8480Baca Svetlana¹, ORCID: 0000-0002-2121-2091¹Institute of Applied Physics, Moldova State University, Chisinau, R. Moldova²Institute of Inorganic Chemistry, RWTH Aachen University, Aachen, Germany

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Due to their unique structure and the combined contributions of 3d-4f metals in the physical properties, Fe-Ln clusters have attracted interest in the context of spin-transfer-based molecular magnets and molecular spintronics. In these systems, iron ensures magnetic coupling, while the lanthanides provide strong anisotropy. A new series of nonanuclear [Fe₅Ln₄O₂(OH)₆(piv)₁₃(bdea)₂(H₂O)₂]·2(*i*PrOH)·H₂O clusters (Ln = Pr (1), Nd(2), Hpiv = pivalic acid) have been prepared by the reaction of trinuclear Fe(III) pivalate with Ln(NO₃)₃·xH₂O and N-butylldiethanolamine (bdeaH₂) in *i*PrOH–MeCN. Single crystal X-ray analysis reveals that clusters 1 and 2 are isostructural and crystallize in the triclinic *P*-1 space group. The clusters are comprised five Fe(III) and four Ln(III) ions, bridged by two μ₄-O, six μ₃-OH[−] groups, nine deprotonated piv[−] and two bdea^{2−} ligands. Four piv[−] ligands and two water molecules complete the coordination sphere of Ln ions (Fig. 1). The {Fe₅Ln₄} core can be viewed as two fused {Fe₂Ln₂O₄} heterodidcubane units joined by a common Fe atom and decorated with two additional Fe centers. All iron atoms are hexacoordinated and exhibit FeO₆ or FeNO₅ distorted polyhedra, while all Ln atoms have LnO₉ distorted polyhedra. Their structural, spectroscopic, thermal, and magnetic properties will be discussed in detail.

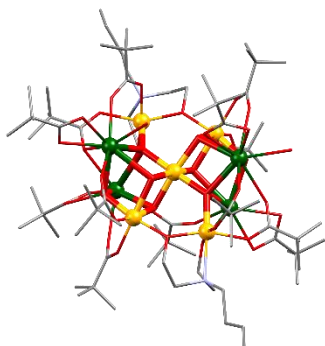


Fig. 1. Structure of
[Fe₅Ln₄O₂(OH)₆(piv)₁₃(bdea)₂(H₂O)₂]
in 1 and 2.

Acknowledgments: This study was supported by the subprogram 011202 financed by the Ministry of Education and Research of R. Moldova and the research project “MultiClust” (01DK25013 and 25.80013.5007.07GER) financed by the German Federal Ministry of Education and Research (BMBF) and the National Agency for Research and Development (NARD).

Keywords: iron, lanthanide, coordination compound, carboxylic acid, X-ray diffraction.

DECANUCLEAR $\{\text{Ce}^{\text{IV}}_6\text{Co}^{\text{III}}_4\}$ ISOBUTYRATE NANOCLUSTER WITH N-BUTYLDIETHANOLAMINE

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Heterometallic d-f coordination clusters are of current interest in the field of chemistry and material science due to their unique magnetic properties and potential application in high-density information storage devices, quantum computing, spintronics, and magnetocaloric materials. As part of our ongoing research in the development of 3d-4f complexes, a new heterometallic $[\text{Ce}^{\text{IV}}_6\text{Co}^{\text{III}}_4\text{O}_8(\text{ib})_8(\text{bdea})_4(\text{NO}_3)_4] n(\text{solvent})$ (**1**) nanocluster has been synthesized by the reaction of cobalt(II) isobutyrate (Hib = isobutyric acid) and $\text{Ce}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ with N-butyldiethanolamine (H_2bdea) in a MeCN solution. Single crystal X-ray diffraction reveals that the compound crystallizes in the $P2(1)/c$ space group of the monoclinic system and possesses a robust and unusual $\{\text{Ce}^{\text{IV}}_6\text{Co}^{\text{III}}_4\}$ core topology (Fig. 1). Its structural, spectroscopic, thermal, and magnetic properties will be discussed in detail.

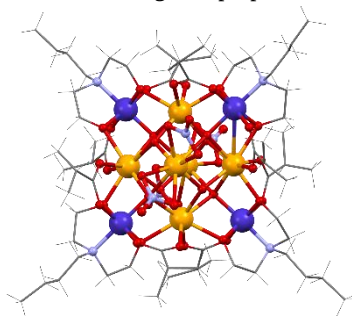


Fig. 1. Structure of the $[\text{Ce}^{\text{IV}}_6\text{Co}^{\text{III}}_4\text{O}_8(\text{ib})_8(\text{bdea})_4(\text{NO}_3)_4]$ cluster.

Acknowledgments: This study was supported by the bilateral project “MultiClust” (01DK25013 and 25.80013.5007.07GER) supported by the German Federal Ministry of Education and Research (BMBF) and the Moldovan National Agency for Research and Development (NARD).

Keywords: cobalt, lanthanide, synthesis, nanocluster, X-ray diffraction, magnetism.

CHARACTERISTICS OF VRANCEA EARTHQUAKES FELT IN 2022–2025 ON THE TERRITORY OF MOLDOVA

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The main seismic hazard in the Carpathian region is associated with the regular activity of intermediate-depth earthquake sources in the Vrancea zone. This study analyzes the characteristics of seismicity in the Vrancea focal area during the period from 2022 to early 2025, focusing on five earthquakes that were felt on the territory of Moldova. Special attention is given to the influence of focal mechanisms on the macroseismic effects of these events.

The strongest earthquakes are examined in detail. For two of them, macroseismic data were collected across the country, and isoseismal maps were elaborated. The earthquake intensity was assessed using the MSK-64 scale.

Focal mechanisms were determined based on first P-wave arrivals and Centroid Moment Tensor (CMT) solutions, which provide a detailed representation of the source geometry.

The southwestern part of Moldova is most exposed to macroseismic effects; according to the seismic zoning map, it lies within the 8-intensity zone. The magnitude of intermediate-depth earthquakes during the analyzed period did not exceed $M_w = 5.4$, with maximum epicentral intensity reaching $I_0 = 5$. On Moldovan territory, observed intensities did not exceed level $I = 4$ on the MSK-64 scale.

Increased seismic activity was observed in 2022 and 2024, while 2023 was relatively quiet.

The analysis of focal mechanisms reveals that the Vrancea zone is affected by nearly horizontal compressive forces and near-vertical extensional forces. Thrust faulting predominates in the foci, with compression oriented perpendicular to the strike of tectonic structures.

The study of the effects of crustal and subcrustal earthquakes contributes to refining Moldova's official seismic zoning map.

Acknowledgments: This study was supported by the research project "Geological and Seismological Study of the Territory of the Republic of Moldova for the Assessment of Geohazards and the Rational Use of Mineral Resources" (acronym: GEOSM, code: 010901), funded by MSU from State budget.

Keywords: Vrancea zone, macroseismics, earthquake's intensity, focal mechanism.

GOLD NANOPARTICLES: PREPARATION, PROPERTIES AND APPLICATIONS

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In this study, we present a clean, non-toxic and environmentally friendly synthetic procedure to generate a wide variety of AuNPs gold nanoparticles using chitosan, a biocompatible, biodegradable, natural biocompatible polymer, as a reducing and stabilizing agent. By the modified Turkevich method, monodisperse nanoparticles are obtained, the size of which varies depending on the concentration of the reducing agent and also on the size of the ligand it stabilizes. The stabilization of the nanoparticles is achieved by the formation of an organic “nanoshirt” on the growth surface, controlling the size and shape by the concentration of the reducing agent and the stabilizer. The formation of gold-chitosan nanoparticles was characterized by UV-VIS absorption spectroscopy, X-ray diffraction (XRD), Raman spectroscopy, Zeta potential. The results show that the reaction temperature plays a crucial role in controlling the size, shape and crystal structure of gold nanoparticles. In addition, it is demonstrated that chitosan can act as a scaffold for the assembly of nanoparticles, which have been successfully applied as a substrate for surface-enhanced Raman scattering (SERS). The basic properties of a colloidal solution of gold nanoparticles are mainly specific properties resulting from the size of the nanoparticles and their interaction with an electromagnetic field.

Acknowledgments: *This work was supported by the project "Design of supramolecular architectures based on metal phthalocyanine derivatives - functionalized nanoparticles for medicine" (PN-IV-P8-P8-83ROMD-2023-0048), led by Dr. Airinei Anton. The authors would like to thank the team of the Scientific Research Laboratory "Advanced Materials in Biopharmaceutics and Engineering" of the State University of Moldova, Republic of Moldova.*

Keywords: *nanoparticule, difracție de raze X (XRD), spectroscopie Raman, potențial Zeta.*

EXCITONIC STATES IN II-VI SEMICONDUCTORS WITHIN THE GREEN'S FUNCTION FORMALISM

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Excitonic states play an important role in the determining the optical and electronic properties of semiconductors, especially near the fundamental absorption edge. II-VI semiconductors are particularly interesting due to their wide bandgaps, strong excitonic effects, and relevance for optoelectronic and photonic applications.

The behavior of quasiparticle bound states in II-VI semiconductors was described within the framework of Green's function method. This formalism allows the construction of a self-consistent theoretical approach that accounts for the screening of Coulomb interaction, exchange and statistical effects, as well as bands population. The approximate variational and perturbation theory methods were used for the numerical analysis of excitonic states, within the framework of Green's function method.

Based on the theoretical and numerical analysis of quasiparticle bound states, a threshold dependence of exciton behavior on the screening condition was identified. When the exciton binding energy approaches zero, the bound state dissociates, leading to a transition into an electron-hole plasma – known as the excitonic Mott transition. By use of screening and fill-factor, the dependencies of exciton binding energy and radiative annihilation energy on temperature and carrier concentration were obtained. In addition, the coupling between the excitonic state and LO-phonons was analyzed.

The resulting exciton model was applied to II-VI semiconductor materials. Material-dependent excitonic parameters, such as the excitonic Rydberg energy and Bohr radius, were determined for these materials. Based on the developed model and extracted parameters, the Mott criterion was established. The obtained results are consistent with experimental data.

Acknowledgments: *This study was supported by RM National Subprogram 011207, funded by Ministry of Education and Research.*

Keywords: *quasiparticle bound state, Green's function method, II-VI Semiconductors. exciton, phonon.*

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Session E

MATHEMATICAL MODELING, INFORMATION TECHNOLOGIES, ARTIFICIAL INTELLIGENCE AND BIG DATA IN NATURAL SCIENCES

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INTEGRATED COMPUTATIONAL APPROACH FOR ANALYZING BIOACTIVE COMPOUNDS IN CARDIOVASCULAR DISEASES

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The purpose of this study is to conduct a critical analysis of recent scientific literature on the application of integrated computational methods for the analysis and classification of bioactive compounds used in the treatment of cardiovascular diseases (CVDs). The focus is on combining cheminformatics, bioinformatics, and artificial intelligence techniques to support early-stage drug discovery.

Methods involved a systematic review of publications from the last 10–15 years, sourced from databases such as PubMed, Scopus, and Web of Science. The review highlights quantitative structure–activity relationship (QSAR) modeling, molecular docking, multi-omics analysis, and machine learning algorithms as central tools for predicting biological activity and toxicity of compounds.

Current findings are theoretical and aim to synthesize foundational knowledge in the field. The analysis reveals a growing trend toward interdisciplinary models that integrate diverse data types and computational approaches to improve drug candidate identification for CVDs.

In conclusion, further empirical research and the development of a custom predictive model are planned as part of the doctoral project.

Acknowledgments: *Supported by the Doctoral School of Natural Sciences, Moldova State University.*

Keywords: *cardiovascular diseases, cheminformatics, bioinformatics, machine learning, QSAR, drug discovery.*

CODERUNNER ITEMS – AN INNOVATIVE APPROACH TO DEVELOPING COMPUTER PROGRAMMING SKILLS

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We live in a constantly changing world, and the use of digital tools in the educational process is becoming an increasingly obvious necessity.

Coderunner items allow programming skills to be assessed by generating unique exercises for each student, eliminating the possibility of copying and ensuring more accurate testing of individual skills.

Purpose. Identifying opportunities to organize and carry out the student assessment process through Coderunner items available on the Moodle platform, which allow the automatic generation of programming problems and autonomous verification of solutions, thus providing a more efficient and equitable testing environment.

The paper analyzes and synthesizes the implementation of Coderunner items in formative and summative assessments, highlighting the current state, challenges, trends, good practices and viable solutions for their integration into the educational process. The use of calculated items contributes to the active involvement of students and the development of practical skills, offering each student a unique test variant. In line with the Education 2030 Strategy, this approach supports the digital transformation of assessment by individualising tests, reducing fraud, automatic correction and providing immediate feedback.

Streamlining the evaluation process, by significantly reducing the time needed for evaluation (by at least 50-75% compared to the manual composition and correction of items and tests).

In conclusion, Coderunner item-based e-testing is a modern and effective solution for assessing programming skills.

The paper highlights the essential contribution of teachers in the application of the innovative model used on the CEITI platform (<https://moodle1.ceiti.md/login/index.php/>), developed within the Innovation and Technology Transfer Project "Increasing academic performance in the Computer Science/ICT discipline by implementing standardized assessment tools on the Moodle eLearning platform", approved by MEC Order no. 364 of 18.03.2025.

Keywords: *platform, e-learning, moodle course, item, coderunner*

H5P-BASED DIGITAL TOOLS IN MOODLE FOR ADAPTIVE MATHEMATICS EDUCATION

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This research explores the potential of *H5P tools (HTML5 package, empowers everyone to create interactive content)* integrated into the *Moodle platform* to enhance *digital learning and assessment in mathematics*. It aims to overcome the limitations of traditional methods, such as *static assessments, scalability issues, and vulnerability to academic dishonesty*, by introducing *interactive, randomized, and cognitively engaging exercises*.

The purpose of this work is to design and test mathematical learning objects and evaluation tasks using advanced H5P content types such as *Interactive Video, Drag and Drop, Arithmetic Quiz, Single Choice Set, Flashcards, Dialog Cards*, and especially *Course Presentation* combined with *Question Sets* and glossary-based random generators, that reinforce thematic terminology and symbolic language—essential in algebra, geometry, and number theory.

The methodology involved the creation of item banks prepared in familiar environments like MS Excel and Word, then converted and uploaded into Moodle using H5P-compatible formats. The activities were deployed in real classroom settings during formative and summative evaluations. Randomization algorithms ensured that each test instance differed using combinatorics-based logic: for example, selecting 15 items from a pool of 100 yields over 2.5×10^{17} unique combinations, which ensures anti-fraud robustness and individualized learning.

Main results show that H5P tools:

Enhanced students' conceptual retention through game-based learning.

Offered adaptive feedback, immediate error detection, and scalable deployment.

Allowed the consolidation of definitions, rules, and procedures using interactive puzzles and knowledge recall activities.

Enabled dynamic assessment with randomized distractors, reducing cheating in synchronous testing environments.

The conclusions confirm that *H5P transforms digital assessment* into a *modular, neuro-aligned, and motivating experience*, tailored to how students explore and consolidate mathematical structures. Unlike static question types (e.g., single-answer MCQs), *interactive games* like *Millionaire* and glossary-based matchings ensure *content diversity and didactic rigor*.

Acknowledgments: *The tools were tested on the eLearning platforms of USM and CEITI as part of the Innovation and Technology Transfer Project 'Enhancing Academic Performance in Informatics/ICT through Standardized Assessment Tools on Moodle', approved by MEC Order №364 on 18.03.2025.*

Keywords: *H5P, Moodle, mathematics, gamification, randomized testing.*

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OBSERVATIONS ON MORPHOMETRIC INDICATORS DETERMINED BASED ON THE DEM WITHIN CALINTIR HYDROGRAPHIC BASIN

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This article aims to evaluate the morphometric characteristics of the relief using the techniques used in ArcGis. With the help of spatial modeling tools, based on the numerical model of the terrain, the main morphometric characteristics of the relief were highlighted and their quantitative analysis was given based on the calculations performed by the program. With the data obtained in the attribute table, using graphic visualization tools in Excel, graphs were created that show us the weight and quantity of the parameters.

Thus, thanks to the utility of the calculation and modeling tools in Arc Gis and the Excel program, we analyzed the slope, the exposure of the slopes, the density and depth of the fragmentation of the relief, the angle of the slope. All of these are very useful in the complete description of a territory and the results obtained can be used in various fields such as tourism, construction, anti-erosion management in agriculture, etc.

Acknowledgments: *This study was supported by the research project within the doctoral program Environmental Protection and Rational Use of Natural Resources of the Doctoral School of Environmental Sciences, Moldova State University.*

Keywords: *morphometry, Digital Elevation Moldel, exposure of the slope, density of the relief, angle of the slope.*

DEVELOPMENT AND RESEARCH OF HASH FUNCTIONS, INCLUDING QUASIGROUP-BASED

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Hashing plays a key role in modern information technologies, providing efficient storage, retrieval and integrity checking of data. Traditional hashing methods such as MD5, SHA-1 and their variants, although widely used, face limitations in the case of large data volumes and increased security requirements.

In recent years, there has been increased interest in alternative hashing methods based on abstract algebraic structures. Quasigroups and groupoids are important representatives of these structures with unique properties for hashing applications.

The conducted research is aimed not only at studying hashing functions based on quasigroups, but also at analysing the potential of using the constructed functions in various applications. The relevance of the research stems from the need to create more secure and efficient hashing methods capable of meeting modern requirements for data processing and protection.

An algorithm for constructing quasigroups of order n used in the hashing process has been developed. The set of quasigroup data is written to a separate file, which will be the key during hashing. To obtain the final hash value, a chain hashing method has been applied where the intermediate hash values are concatenated. This method ensures that the result is unique and collision resistant.

A hash function "hash_function" was developed based on a given quasigroup and parameter k . The constructed structure demonstrates the possibility of using this method to create hash values. At the stage of implementation of the software application, the function "docx_to_num" was implemented to convert text documents (.docx format) into a sequence of bits, which will be presented as an initial message.

The proposed hashing method demonstrates the possibility of effective use in applications requiring fast and reliable data matching and integrity checking.

Acknowledgments: *The Institutional Research Program of the Moldova State University for 2024-2027 years, subprogram 011303 has supported part of the research for this paper.*

Keywords: *quasigroup, Latin square, encryption, one-way function, cryptography, block cipher, symmetric-key encryption.*

PROLONGATION AND RECURSIVE DIFFERENTIABILITY OF QUASIGROUPS

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The methods of prolongation and recursive differentiability of finite quasigroups are investigated in the present work. A new method of prolongation of finite quasigroups, using two transversals which intersect in exactly one cell, is proposed and studied. Necessary and sufficient conditions of recursive k – differentiability of quasigroup operations are given.

The main method involves extending a finite quasigroup by adding new elements via carefully constructed transversals. It is shown that there exist 240 distinct prolongations of Latin squares of order five using such transversals. Out of twelve main types of these prolongations, six keep the recursive structure. This work also gives rules that help decide when an expanded quasigroup keeps this recursive property, including for well – known prolongation methods by Bruck and Belousov.

In conclusion, results indicate that while recursive differentiability can be preserved under specific prolongations, certain transversal configurations – especially those involving fixed diagonals – fail to maintain this property.

This research helps to better understand how to build complex quasigroups and may be useful in areas like coding theory and combinatorics.

Acknowledgments: *This study was supported by the Institutional Research Program 011302 "MANS DP" for 2024 – 2027, funded by Moldova State University.*

Keywords: *k -ary quasigroup, recursive derivative, recursively differentiable quasigroup, prolongations of quasigroups, transversal, Latin squares.*

INTEGRATING LLM-BASED AUTOMATION INTO CI/CD WORKFLOWS FOR WEB APP TESTING

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In the context of accelerated web application development and widespread DevOps adoption, the automation of testing processes has become a major factor in maintaining software quality, stability, and fast delivery cycles. Traditional automated testing tools, although effective in static environments, often face significant limitations in CI/CD (Continuous Integration / Continuous Delivery) workflows, where frequent code updates and high release velocity challenge the reliability, scalability, and maintainability of test suites.

The purpose of this study is to investigate the potential of artificial intelligence (AI), with a particular focus on Large Language Models (LLMs), to enhance and support the automation of software testing pipelines in CI/CD environments. The research is conducted through a bibliographic analysis of recent advances in AI-driven testing methodologies, including techniques for automated test generation, flaky test detection, dynamic test case selection, and test suite maintenance.

As a representative case, the open-source pipeline PACGBI (Pipeline for Automated Code Generation from Backlog Items) is analyzed. PACGBI integrates LLMs within GitLab CI to automate code generation and merge request creation based on backlog items directly stored in the repository. Although the current functionality of PACGBI is focused primarily on generating source code, its modular design provides a strong architectural foundation for future extension with AI-assisted testing capabilities. This integration could enable the transition from isolated code generation to full-cycle intelligent automation.

The results of this theoretical study suggest a clear opportunity to unite code and test automation within a single, intelligent CI/CD pipeline. Tools such as PACGBI, when extended with AI-driven test generation and validation, could support the creation of adaptive testing systems that respond to continuous change with minimal human intervention.

In conclusion, this research demonstrates the growing relevance of AI-augmented automation tools in modern software engineering workflows and sets the stage for future experimental work aimed at designing intelligent, self-improving testing frameworks tailored to CI/CD-based web application development.

Keywords: *automated testing, large language models, CI/CD pipelines.*

FLAVONOIDS IN PLANT STRESS ADAPTATION: GLOBAL RESEARCH PERSPECTIVES AND SUNFLOWER CASE STUDIES

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Flavonoids are a diverse group of phenolic compounds that play crucial roles in plant biology. Recent research has identified flavonoid compounds associated with abiotic stress tolerance. For instance, flavonoids that co-localize with genetic loci involved in responses to stress factors like drought and salinity have been identified. These findings suggest that flavonoids contribute to sunflower's ability to cope with adverse environmental conditions. Also, in abiotic stress conditions, the expression of genes involved in the biosynthetic pathways of flavonoids is significantly increased, leading to their accumulation in vulnerable tissues such as young leaves, roots, or cell walls. In the case of sunflower (*Helianthus annuus* L.), recent genomic research has identified quantitative trait loci (QTL) for drought and salinity tolerance that co-localize with genomic regions involved in flavonoid biosynthesis. Thus, flavonoids are not only biochemical markers of the stress response but also potential genetic targets for improving tolerance to extreme pedoclimatic conditions.

Given the significance of flavonoids in plant biology, this study aims to explore global research trends by analyzing data from the National Center for Biotechnology Information (NCBI) databases. To investigate the broader scientific landscape 32 NCBI databases were queried using 13 keyword combinations related to flavonoids in areas such as proteomics, genomics, metabolomics, systems biology, plant physiology, and biotechnological applications. Search terms also included the species name *Helianthus annuus* to identify sunflower-specific research outputs. The analysis aimed to map the evolution of scientific interest and research output concerning flavonoids, with a particular focus on how these compounds are studied in relation to plant biology and stress adaptation.

Results revealed that the highest volume of relevant data was located in bibliographic databases, particularly PubMed and PubMed Central. A total of 459,111 peer-reviewed articles related to flavonoids in plants were identified, of which 11,649 specifically addressed sunflower. Within this corpus, 81,548 articles (1,918 for sunflower) examined physiological roles of flavonoids, particularly their involvement in regulating growth, stomatal function, auxin transport, and responses to drought, salinity, and biotic stress. Biochemical studies, with 80,256 general articles and 1,807 focusing on sunflower, explored their antioxidant capacity and role in cellular metabolism. Molecular biology research, represented by 64,867 general publications and 1,441 on sunflower, are focused on gene regulation, defense pathways, and

potential applications in crop improvement and functional food production. So, different strategies of molecular breeding have been employed to enhance flavonoid production in various crops, including tomatoes, rice, maize, and potatoes, leading to improvements in nutritional value, color, disease resistance, and stress tolerance. Genomic and transcriptomic tools, such as RNA-Seq and qPCR, have identified key enzymes and transcription factors that regulate flavonoid biosynthesis, underscoring their importance for sustainable agriculture and crop resilience in the face of climate variability.

In conclusion, this study demonstrates the value of systematic bioinformatic analysis in synthesizing large-scale scientific data and tracking research trends. The widespread and consistent focus on flavonoids in physiology, biochemistry, and molecular biology underscores their biological significance and practical relevance in crop science. For sunflower, in particular, flavonoids emerge as central players in the adaptation to environmental stressors and as promising molecular tools for advancing sustainable agriculture. This comprehensive informatics-based assessment provides a foundation for future experimental and applied studies targeting flavonoid pathways to improve crop resilience amid ongoing climate challenges.

Acknowledgments: *The study was conducted within the Subprogram 011101: Genetic and biotechnological approaches to agroecosystem management under climate change and the project PN-IV-P8-8.3-ROMD-2023-0269: Comprehensive valorization of Helianthus annuus by-products for the development of new products with biomedical potential.*

CODERUNNER - INTERACTIVE TOOL FOR SELF-TRAINING IN PROGRAMMING

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Currently, digitalization is a priority link in the innovative educational process and has become a pressing necessity. An essential role in this transformation is played by the integration of digital competence and information and communication technologies (ICT) in teaching. And online assessment on various educational platforms is gaining momentum. In this context, CodeRunner items, which allow practical testing of programming skills, are ideal for either self-learning or self-assessment. Through this tool, each student has an interactive interface at their disposal, which allows them to write and test the source code in a specific programming language, thus contributing to the practice of knowledge and the evaluation of the level of performance.

The purpose of the paper is to explore the advantages of individualized learning of a programming language by using CodeRunner items in online assessments.

The paper provides a concise and well-argued analysis of the integration of CodeRunner items in summative and formative assessments. Viable solutions and effective strategies to strengthen digital skills through interactive assessments, boosting students' performance and algorithmic thinking are also proposed.

The integration of CodeRunner items in the evaluation process is an innovative and promising initiative, it contributes to a more objective, faithful and relevant assessment of their real level of knowledge and skills.

Information technologies and modern methods of teaching, learning and assessment assisted by ICT require profound transformations in the education system, requiring new skills from both teachers and students. A reconfiguration of teaching activities and educational scenarios is needed, in order to develop and use online tests effectively. The management of quality educational platforms can no longer be carried out exclusively through traditional and manual methods, which have become insufficient in relation to the current requirements. Innovative, sustainable and cost-effective solutions are therefore required.

In conclusion, the electronic test is currently one of the most widespread forms of (self-)assessment. The process of developing items and generating tests for computer-assisted assessment is an essential stage in continuous (self-)training, which requires creativity, methodological rigor, originality and compliance with the principles of professional ethics.

The paper emphasizes the active role of teachers in applying this innovative model on the CEITI platform (<https://moodle1.ceiti.md/login/index.php/>), implemented within the Innovation and Technology Transfer Project "Increasing academic performance in the Computer Science/ICT discipline through the implementation of standardized assessment tools on the Moodle eLearning platform, approved by MEC Order no. 364 of 18.03.2025.

Keywords: *platform, e-learning, moodle course, item, coderunner*

OPPORTUNITIES OF USING CALCULATED ITEMS IN THE EVALUATION PROCESS

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The need to integrate Information and Communication Technologies (ICT) in education reflects the essential transformations of the modern instructional-educational process. The use of e-learning tools is increasingly contributing to the efficiency of teaching, learning and asation by applying knowledge in practical contexts, provides immediate feedback, facilitates the analysis of results, and supports active and personalized learning.

Digital assessment is becoming an essential element in the modern educational process, especially in technical vocational education. The use of calculated items offers numerous opportunities for effective testing of students' knowledge, either in computer-assisted written format or directly through online platforms. The tests can be saved and reused, thus giving teachers flexibility in evaluation and the possibility to analyze the results easily. Students can respond individually, receiving automatic feedback, which stimulates active learning and immediate correction of mistakes.

The use of calculated items in the evaluation process offers numerous valuable opportunities in the study of Mathematics and Computer Science, significantly contributing to increasing the efficiency and quality of the educational act. First, these items allow for the automatic generation of custom problems, by using variable parameters, so that each pupil or student receives a unique version of the test. This helps to reduce the risk of fraud and encourages genuine individual resolution.

The purpose of this paper is to highlight the potential of calculated items as a truthful and efficient assessment tool within the disciplines of Mathematics and Computer Science, contributing to the identification of students' real skills. By automatically generating exercises with different variables, this type of item allows the customization of the tests, offering each student a unique task, adapted to their level of preparation. This ensures an objective assessment, minimises the risk of fraud and stimulates active and applied learning.

In an increasingly digitized educational context, calculated items are a modern, accurate and flexible assessment tool that meets the current requirements of quality and efficiency in learning. Applied to subjects such as Mathematics and Computer Science, they provide a valid and reliable framework for measuring students' cognitive, operational, and technical skills.

The paper highlights the crucial role of teachers in the implementation of the innovative model on the CEITI platform (<https://moodle1.ceiti.md/login/index.php/>), carried out within the Innovation and Technology Transfer Project "Increasing academic performance in the Computer Science/ICT discipline through the use of standardized assessment tools on the Moodle platform", approved by MEC Order no. 364 of 18.03.2025.

Keywords: *platform, e-learning, moodle course, item*

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FEATURES OF THE EMPIRICAL-THEORETICAL APPROACH TO THE MODELING OF *Pinus sylvestris* L. STANDS IN EURASIA

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At present, a wide range of scales is employed in the compilation of tables on tree growth. Furthermore, the so-called historical approach to constructing Table of Growth Stand (TGS) involves averaging the values of stand parameters over time. Any of the following methods can also be considered ensemble averaging techniques:

- a) the Garting index planting approach (analytical);
- b) the Baur strip technique (statistical);
- c) the Geyer repeated enumeration methodology (combined);
- d) the typological method, and so forth.

The objective of this study is to demonstrate that the elaborated EFM-model accurately mirrors the precision of empirical models, rendering it suitable for describing the dynamics of stand growth represented by local TGSs.

The foundation of the EFM model lies in the estimation of the duration required for a forest stands to reach its maximum biomass, denoted as $t_{\max}$. In most cases, existing TGS data non provide estimates of $t_{\max}$, and thus, the values of $t_{\max}$ were derived through the process of extrapolating from the data points representing the highest biomass values corresponding to specific time intervals. These biomass values can be characterized as a function of time that tends towards an asymptotic maximum.

In order to determine the density of trees per hectare, a differential equation was formulated as follows:

$$\frac{dN(t)}{dt} = (f_1 g_1 m_1^{q_1-1} - r_1)N$$

The solution of equation can be represented as follows:

$$N(t) = N_0 \frac{(1+b_1)^{p_1}}{(1+b_1 \exp(-a_1 t))^{p_1}},$$

where $b_1 = \left(\frac{N_\infty}{N_0}\right) - 1$, $a_1 = r_1(1-q_1)$, $p_1 = 1/(1-q_1)$; f is the specific rate at

which a resource is assimilated, r denotes the specific rate of consumption of a resource, while g and q constitute allotropic parameters in the model that reflect the correlation between biomass and the surface area of the tree.

The parameter r in the model remains constant across all regions of Eurasia. For 80% of these regions, r is equal to 0.05, while for the remaining regions, the deviation from 0.05 ranges from 0 to 0.001. There are two exceptions to this pattern: Arkhangelsk Oblast and Western Siberia.

It is well established that the EFM-model has a thermodynamic basis. Therefore, we can conclude that the findings derived from the model's calculations are thermodynamically valid. In other words, from a thermodynamic perspective, the bonus scale derived from the EFM model's results is also supported by thermodynamic principles. Furthermore, the rate of resource utilization can be considered an ecological constant across all forest stands in Eurasian regions.

The values of the following pair of variable parameters do not remain constant but rather exhibit significant variability across various regions. This phenomenon is not surprising, as the TGS demonstrate a substantial disparity in terms of stand biomass and the number of trees per hectare when these values are considered simultaneously.

However, for EFM purposes, a thorough understanding of these parameters becomes crucial, as they significantly influence the maximum, model-predicted biomass of a forest stands, denoted as $M_{\infty} = m_{\infty}N_{\infty}$. In the context of optimization, if it is determined that the limiting biomass of the forest stands falls below the maximum value, the model may exhibit a "non-monotonic" behavior over extended periods of time.

Conclusions

1. The EFM-aided analysis of growth dynamics can be employed to examine the data contained in the existing stand growth tables.
2. The rationale behind the bonitet scale is rooted in thermodynamics, as evidenced by the fact that the parameter r remains independent of forest typology.
3. In order to validate the established patterns, further research in this field is required.

Keywords: *plant growth tables (PGT), bonus scale, ecological and physiological model (EFM), EFM features, natural forest stand.*

SOME ASPECTS OF THE APPLICATION OF MULTIDIMENSIONAL SCALING FOR ANNS MODELING OF PHYSICAL SYSTEMS

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Multidimensional scaling is generally a class of methods for representing the ratios of the characteristic coefficients of any physical processes in space using a visual image. Multidimensional scaling is not just a specific procedure, but rather a way to place objects most efficiently, approximating the observed distances between them. In other words, multi-dimensional scaling places objects in a space of a given dimension and checks how accurately the resulting configuration preserves the correct ratios between the characteristic coefficients. The perceived relationships between objects are represented as geometric connections between points in a multidimensional space. These geometric representations are often referred to as spatial maps. The coordinate axes on the spatial map correspond to the factors of behavior of the physical system or, in other words, the basic dimensions that form this system. There are various algorithms for assigning characteristic coefficients to the parameters of complex physical systems for the subsequent creation of their models for artificial neural networks, as well as algorithms that allow you to create a model of a complex physical system, and then implement a physical process based on this model.

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Keywords: *artificial neural networks, energy efficiency, multidimensional scaling models.*

THE ROLE OF BIOINFORMATICS IN LIVESTOCK PRODUCTION IMPROVEMENT: APPLICATIONS IN ANIMAL GENETICS AND BREEDING

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Bioinformatics is becoming increasingly important in improving livestock production. It helps us better understand the genes responsible for key traits like growth, reproduction, and disease resistance in animals by analyzing genetic data. This paper discusses how protein-protein interaction (PPI) networks, gene identification, and pathway analysis tools assist researchers in identifying the genetic determinants of animal performance. These genes are also being validated, and their function is understood using resources like KEGG, Reactome Pathways and GTEx Portal. The applications of bioinformatics in livestock breeding are improving breeding strategies and increasing productivity and disease management. While there are still challenges, particularly with handling large data sets, the future of bioinformatics in animal breeding holds great potential, especially with integrating AI and mathematical models for more accurate and efficient breeding programs.

Keywords: *Bioinformatics, livestock genetics, animal breeding, PPI networks, pathway analysis, genomic selection, disease resistance.*

LIE OPERATORS ADMITTED BY THE DIFFERENTIAL SYSTEM $s^3(1,3)$

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Consider the ternary differential system $s^3(1,3)$ in the tensorial form

$$\frac{dx^j}{dt} = a_{\alpha}^j x^{\alpha} + a_{\alpha\beta\gamma}^j x^{\alpha} x^{\beta} x^{\gamma} \quad (j, \alpha, \beta, \gamma = \overline{1,3}), \quad (1)$$

where in indices α, β, γ the complete convolution is done, tensor $a_{\alpha\beta\gamma}^j$ is symmetric in low indices, and centro-affine group of transformations of phase variables $GL(3, R)$.

In the School of Differential Equations from Chişinău are researched the ternary polynomial systems of differential equations using centro-affine groups.

It is known that the centro-affine group of transformations $GL(3, R)$ is determined by the following elementary one-parameter transformations:

$$\begin{aligned} \overset{-1}{x} &= \lambda_1 x^1, \overset{-2}{x} = x^2, \overset{-3}{x} = x^3 \quad (\lambda_1 \in R \setminus \{0\}); \quad \overset{-1}{x} = x^1, \overset{-2}{x} = \lambda_2 x^2, \overset{-3}{x} = x^3 \quad (\lambda_2 \in R \setminus \{0\}); \\ \overset{-1}{x} &= x^1, \overset{-2}{x} = x^2, \overset{-3}{x} = \lambda_3 x^3 \quad (\lambda_3 \in R \setminus \{0\}); \quad \overset{-1}{x} = x^1 + \mu_1 x^2, \overset{-2}{x} = x^2, \overset{-3}{x} = x^3; \quad \overset{-1}{x} = x^1 + \mu_2 x^3, \\ \overset{-2}{x} &= x^2, \overset{-3}{x} = x^3; \quad \overset{-1}{x} = x^1, \overset{-2}{x} = \mu_3 x^1 + x^2, \overset{-3}{x} = x^3; \quad \overset{-1}{x} = x^1, \overset{-2}{x} = \mu_4 x^3 + x^2, \overset{-3}{x} = x^3; \quad (2) \\ \overset{-1}{x} &= x^1, \overset{-2}{x} = x^2, \overset{-3}{x} = \mu_5 x^1 + x^3; \quad \overset{-1}{x} = x^1, \overset{-2}{x} = x^2, \overset{-3}{x} = \mu_6 x^2 + x^3. \end{aligned}$$

Theorem 1. *To the representation of the centro-affine group of transformations $GL(3, R)$ in the space of variables and coefficients of the system (1) correspond the Lie operators*

$$\begin{aligned} v_1 &= x^1 \frac{\partial}{\partial x^1} + d_1, \quad v_2 = x^2 \frac{\partial}{\partial x^2} + d_2, \quad v_3 = x^3 \frac{\partial}{\partial x^3} + d_3, \quad v_4 = x^2 \frac{\partial}{\partial x^1} + d_4, \quad v_5 = x^3 \frac{\partial}{\partial x^1} + d_5, \\ v_6 &= x^1 \frac{\partial}{\partial x^2} + d_6, \quad v_7 = x^3 \frac{\partial}{\partial x^2} + d_7, \quad v_8 = x^1 \frac{\partial}{\partial x^3} + d_8, \quad v_9 = x^2 \frac{\partial}{\partial x^3} + d_9, \end{aligned}$$

where d_i are determined explicitly and represents the operators of the representation of centro-affine group of transformations $GL(3, R)$ in the space of coefficients of the system (1).

Remark 1. *These operators satisfy the system of determining equations of the system (1), and are admitted by this system.*

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Keywords: ternary differential system, Lie operators.

TERNARY QUASIGROUPS WITH EXACTLY FOUR DISTINCT PARASTROPHES, WHICH ARE ORTHOGONAL

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A n -groupoid (Q, A) is called a n -quasigroup if in the equality $A(x_1, x_2, \dots, x_n) = x_{n+1}$ each of the elements $x_1, x_2, \dots, x_{n+1}$ is uniquely determined by the remaining n of them ($n \geq 2$). The operation ${}^\sigma A$, defined by the equivalence

$$A(x_1, x_2, \dots, x_n) = x_{n+1} \Leftrightarrow {}^\sigma A((x_{\sigma 1}, x_{\sigma 2}, \dots, x_{\sigma n}) = x_{\sigma(n+1)},$$

where $\sigma \in S_{n+1}$, is called a parastrophe of (Q, A) .

It is known that the number of distinct parastrophes of a ternary quasigroup divides 24. M. E. McLeish studied the possible sets of distinct parastrophes of a ternary quasigroup (Q, A) , using the identities: $A = {}^\sigma A, \forall \sigma \in S_{n+1}$.

Ternary quasigroups with exactly four distinct parastrophes, which are orthogonal, are studied in the present work. We prove that a ternary quasigroup (R, A) , linear over an unitary, associative, commutative ring R , has exactly four distinct parastrophes if and only if the operation A has one the four forms: $A(x_1, x_2, x_3) = \alpha(x_1) + \alpha(x_2) + \alpha(x_3)$, $A(x_1, x_2, x_3) = I(x_1) + \alpha(x_2) + I(x_3)$, $A(x_1, x_2, x_3) = I(x_1) + I(x_2) + \alpha(x_3)$, $A(x_1, x_2, x_3) = \alpha(x_1) + I(x_2) + I(x_3)$, where $\alpha \in \text{Aut}(R, +) \setminus \{I\}$, and $I(x) = -x, \forall x \in R$. Moreover, such set of distinct parastrophes is orthogonal if and only if $\alpha + \varepsilon, \varepsilon + 2I\alpha \in \text{Aut}(R, +)$.

As a corollary, we get that there exist ternary finite quasigroups with exactly four distinct parastrophes, which are orthogonal, of any odd order $q \geq 3$.

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Keywords: n -ary quasigroup, parastrophe, orthogonal n -operations, parastrophic-orthogonal n -quasigroups.

DIGITIZATION OF GEOLOGICAL INFORMATION (DATA – UNDERGROUND GAS STORAGE, MOLDOVA)

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In geology, data obtained from the drilling of deep wells are typically unique and independent of the time at which they were collected. Archived data often include geophysical well logs, which present continuous graphs—such as those depicting the electrical resistivity (ER) of rocks. Interpreting ER values allows geologists to identify rock lithology, correlate different wells, and construct complex geological cross-sections. The purpose of this work is to highlight the peculiarities of digitizing geophysical well data, using as an example geological information from a territory studied for the potential development of a natural gas storage facility in the Republic of Moldova. Methodologically, the research focuses on data from nine wells, each over 1000 meters deep. The study uses ER-type geophysical log graphs, the GetData Graph Digitizer software for digitization, a digitized database (containing approximately 1000 data points per well), advanced graphical methods, and geostatistical procedures to verify the accuracy of digitized data against the original ER logs and to interpret the digital information.

The study area is located in the western part of the Republic of Moldova, covering approximately 660 km² around the town of Ungheni. This territory is considered geologically favorable for the development of an underground natural gas storage facility, which is of strategic importance for the country. For this investigation, nine deep geological wells were selected, drilled between 1948 and 1958, with depths ranging from 1063 to 1228 meters. These wells are well documented, and ER geophysical logs are available for each. The digitization process using GetData Graph Digitizer involves scanning the geophysical logs, converting them into a vector format (e.g., *.pdf), configuring the software, digitizing the graphs, and generating Excel files containing the digitized data points. This data matrix enables the creation of ER vs. depth graphs, representing the digital version of the original logs. These graphs are then compared with the original logs to assess digitization quality. The comparison, expressed by a correlation coefficient ($r = 0.95$), indicates a high degree of statistical similarity between the digitized and original data. The ER values are highly variable, ranging from 0.0 to 50.0 $\text{ohm}\cdot\text{m}$. The digitized materials will be integrated into future research aimed at supporting the case for underground storage of flaring gases. Three-dimensional geological modeling using Petrel software requires accurate geophysical well data.

The main conclusions of the study are as follows:

1. A methodological approach for converting geophysical well logs from graphical to digital format has been developed.
2. The digitized data are suitable for geostatistical correlation of deep well sections and for identifying geological layers.
3. The availability of digital data enhances both the visibility and accuracy of geological interpretations.

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Keywords: *geofizikal log, digitation, deep wells.*

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Session F

HUMAN HEALTH AND TRANSLATIONAL MEDICINE

REGULATION OF KETONURIA IN EXPERIMENTAL DIABETES BY SEV-3 EXTRACT ADMINISTRATION

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One of the relevant clinical manifestations of metabolic imbalance is ketonuria, an indicator of the predominant utilization of fats for energy production, which occurs when glycemic homeostasis is disrupted. Ketonuria is frequently encountered in diabetes, particularly in the advanced stages of the disease when insulin can no longer effectively regulate blood glucose levels. The aim of this study was to evaluate the effects of SEV-3 extract administration on the regulation of ketonuria and the improvement of glycemic metabolic homeostasis in an experimental diabetes model.

The investigations were conducted on laboratory white rats. The diabetes model was induced by alloxan injection in a 5% solution (200 mg/kg). Ketonuria was determined using Standard Combi 11 tests on the URYXXON Relax analyzer. The phytopreparation contains the aerial parts of the following medicinal plants: *Vitis vinifera*, *Equisetum arvense*, and *Syringa vulgaris*.

In the experiments, animals from the alloxanic diabetes group exhibited ketone bodies in the urine, and their concentration continued to rise throughout the study, signaling a significant disturbance in both glycemic and lipid homeostasis. This suggests that experimental diabetes causes considerable metabolic dysfunction, where fat mobilization for energy production becomes predominant in the absence of effective glycemic control. In contrast, in the experimental diabetes group treated with SEV-3, ketone levels showed only minor deviations from normal values, which gradually normalized throughout the experiment. These results suggest that the administration of SEV-3 extract had a beneficial effect on the homeostasis of glycemic and lipid metabolism, contributing to the restoration of metabolic balance and preventing the excessive accumulation of ketones in the urine.

In conclusion, the results suggest that SEV-3 extract may play a significant role in maintaining metabolic homeostasis in experimental diabetes, having a positive effect on the regulation of ketone levels and promoting the stabilization of metabolic processes. The administration of SEV-3 extract reduced deviations from normal ketonuria values and restored metabolic homeostasis. These findings suggest that SEV-3 intervenes in glycemic regulation and helps prevent the excessive accumulation of ketones in dysregulated glucose metabolism.

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Keywords: *diabetes, ketonuria, urine, herbal remedies.*

CHEMICAL CHARACTERIZATION OF TRIFOLIUM L. SPECIES FROM THE FLORA OF THE REPUBLIC OF MOLDOVA

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The genus *Trifolium* L. (Fabaceae) comprises about 240 species, of which 20 are recognized in the flora of the Republic of Moldova (RM). The majority of the studies on the biological properties of clovers concerns *T. pratense* L. (red clover) and is focused on its phytoestrogen action, being a result of isoflavone content. The plants from the genus *Trifolium* L. are used in traditional medicine for their antioxidant, anti-inflammatory, antiseptic, analgesic, antirheumatic and antimicrobial properties. The aim of the study was chemical analysis of plant materials harvested from three clover species from the wild flora of the Republic of Moldova: *T. alpestre*, *T. medium*, *T. pratense*.

The identification of the analyzed species from the spontaneous flora was achieved by observing and comparing distinctive morphological characteristics: the shape of the stem, the leaflets and stipules, the degree of pubescence of the calyx and the color of the flowers. For the chemical analysis, vegetal products (*herba*, *flores*, *folium*, *caulis*) were collected at the flowering stage from three *Trifolium* species. Quantitative analysis of the total content of flavonoids was carried out by the spectrophotometric UV-VIS method. The identification of some flavonoids in the analyzed plant products was performed using the TLC method.

The spectrophotometric determination of total flavonoids (%), expressed as rutin, showed the highest concentration in the leaves of the three clover species studied, followed by the *herba* and *flores* plant parts, with the lowest flavonoid concentration found in the stems. In the *folia* of *T. alpestre*, the total flavonoid content (4.74%) was the highest compared to *T. medium* (3.42%) and *T. pratense* (2.81%). In the plant products of *T. alpestre*, rutin, isoquercitrin and quercitrin were identified; in *T. medium*, hyperoside and isocvercitrin were detected; while isorhamnetin was found in the plant products of *T. pratense*.

The phytochemical analysis performed underlines the importance of further research aimed at establishing quality parameters, conducting pharmacological studies and standardizing vegetal products derived from *Trifolium* species native to the flora of the Republic of Moldova.

Acknowledgments: This study was supported by the research project 080301 „Development of new pharmaceutical products from local raw materia”, funded by Nicolae Testemitanu SUMPh.

Keywords: *Trifolium*, vegetal products, flavonoids.

THE DEGREE OF STUDY ON THE INFLUENCE OF ANTIMICROBIAL DRUGS ON NUTRIENT ABSORPTION IN THE SMALL INTESTINE

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The issue of interaction between antibiotics and nutrients at the level of the small intestine's transport systems is highly relevant for understanding the consequences of antibiotic therapy—not only for the digestive system itself, but also for metabolism and the composition of the intestinal microbiota. The aim of this work is to assess the extent to which this issue has been studied, based on a comprehensive analysis of the specialized literature.

According to the analysis conducted, the impact of antibiotics from various groups on nutrient absorption in the small intestine remains significantly underexplored, and the available findings are often contradictory. In contrast, the influence of nutrients on antibiotic absorption has been studied in much greater detail. At present, there are only limited data, primarily from *in vitro* and *in situ* methodological approaches. These studies have investigated the effects of tetracycline, amoxicillin, cephalixin, cefroxadine, cefatrizine, cephaloglycin, cephadrine, cefaclor, neomycin, clindamycin, levorin, and metronidazole on the intestinal absorption of galactose and glucose, as well as certain amino acids. Most studies have reported a decrease in monosaccharide absorption under the influence of antibiotics. This reduction has been attributed to the inhibition of either the active transport system alone or both active transport and passive diffusion. In some cases, it was accompanied by reduced oxygen supply to enterocytes and inhibition of basolateral Na^+, K^+ -ATPase activity. A few reports have shown that amoxicillin does not have a systemic effect on galactose absorption. Additionally, data are available indicating a significant increase in the absorption of glucose, alanine, aspartic acid, and leucine under the influence of metronidazole. To date, there are no data on the effects of the antibiotic combination used in *Helicobacter pylori* eradication therapy - amoxicillin, metronidazole, and clarithromycin - on nutrient absorption in the small intestine. No studies have been conducted on the impact of any antibiotic group on the absorption of other nutrients in the small intestine. No studies have been conducted on the effect of antibiotics of any group on the absorption of nutrients other than those mentioned above in the small intestine.

Thus, given its clear significance, insufficient exploration, and the contradictory nature of the existing data, the issue of how antimicrobial drugs affect nutrient absorption in the small intestine requires further comprehensive study.

Keywords: nutrient absorption, small intestine, antimicrobial drugs.

MULTILATERAL CHARACTERIZATION OF PATIENTS WITH CHRONIC HCV INFECTION

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Chronic Hepatitis C Virus (HCV) infection is a systemic disease with a broad spectrum of clinical manifestations. Beyond hepatic involvement, HCV often presents with extrahepatic syndromes that impact patients' quality of life and complicate disease management. Understanding the clinical diversity of HCV infection is essential for effective diagnosis and individualized treatment strategies.

This study aimed to provide a multilateral clinical characterization of patients with chronic HCV infection, emphasizing the importance of recognizing specific symptom clusters and their correlation with disease severity, viral genotype, and therapeutic approach. The findings underline the necessity of a personalized approach in managing chronic HCV infection.

A clinical assessment was conducted on patients with chronic HCV infection, focusing on the identification of defined symptom complexes: asthenovegetative, dyspeptic, arthralgic syndromes, and organomegaly (hepatomegaly and splenomegaly). The Multidimensional Fatigue Inventory (MFI-20) was used to assess fatigue. Imaging (ultrasound) and scintigraphy were employed for organ evaluation. Biochemical and molecular markers, including viral genotyping, were analyzed to establish clinical correlations.

The combined clinical, biochemical, and molecular analysis creates a comprehensive pathogenic profile for each patient and enables tailored, targeted antiviral therapy. Timely diagnosis of genotype not only anticipates disease progression but also optimizes treatment outcomes.

Effective HCV eradication relies on two essential principles: early and accurate laboratory diagnosis and genotype-specific antiviral therapy.

- **Asthenovegetative Syndrome** was identified in 63% of patients, characterized by fatigue, dizziness, headaches, and sleep disturbances. Over 90% showed signs of autonomic dysfunction (anxiety, mood swings).
- **Dyspeptic Syndrome** included symptoms such as early satiety, epigastric pain, and bloating, consistent with functional dyspepsia.
- **Arthralgic Syndrome** was present in a notable proportion of patients, with joint pain observed despite normal radiographic findings but increased scintigraphic uptake.
- **Hepatomegaly** was found in 100% of patients and **splenomegaly** in 56.66% (17 patients) based on ultrasound.
- Patients with **HCV genotype 1b** exhibited more severe symptoms, higher viral loads, and advanced liver fibrosis.

The clinical diversity of chronic HCV infection necessitates an individualized diagnostic and therapeutic approach. Multidimensional clinical evaluation combined with genotyping provides a complete pathogenic profile for each patient, enabling precise, genotype-specific antiviral therapy. Early diagnosis and targeted treatment remain key principles in achieving effective viral eradication and improving patient outcomes.

**THE PERSPECTIVE OF LEARNING THROUGH BIOTECHNOLOGICAL
RESEARCH FOR STUDENTS OF THE FACULTY OF PHARMACY,
NICOLAE TESTEMITANU SUMPh**

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Propose: To define the directions of learning through plant biotechnology research for undergraduate, postgraduate, and doctoral students in pharmaceutical education.

Methods: The study involved an evaluation of pharmacy curricula from various universities and a review of contemporary research on plant biotechnology applications in the pharmaceutical field, using information platforms such as PubMed, Scopus, Web of Science and Google Scholar.

Results: At the Faculty of Pharmacy learning through systemic (intra-, inter- and multidisciplinary) and STEAM approaches is complimented by an innovative strategy of learning that integrates research-based education, particularly in biotechnological scientific research. In this regard, the Laboratory of Pharmaceutical and Plant Biotechnologies was founded through the implementation of the MER project "Higher education in Moldova", subproject: *"Modernization and Strengthening of Research-Based Education in Pharmacy and Medicine - FORCE_FARM*. This laboratory serves as a modern platform for developing research-based learning strategies. Thus, the research directions have been defined for students, master's programs, residency, and doctoral studies:

- Development of practical skills in young scientists for biotechnology research;
- Tasting and elaboration of protocols for *in vitro* multiplication and micropropagation of medicinal plants as a source of biological material for pharmaceutical research;
- Multiplication of medicinal plants and obtaining of healthy plant material for the initiation of medicinal plants collections with vulnerability degree for genomic conservation and preservation of national heritage;
- Multiplication of medicinal plant species from different geographic regions, introduced in the curricula of the subjects of the study plan;
- Expanding and strengthening existing medicinal plant collections to enhance the taxonomic diversity of the SPCFMP collection at Nicolae Testemitanu SUMPh.
- Initiation of *in vitro* cellular cultures of different classes of biologically active compounds with pharmaceutical, cosmetic and nutritional applications.

Conclusions: The establishment of the Laboratory of Pharmaceutical and Plant Biotechnologies will be a modern scientific base for training a new generation of pharmacy specialists with advanced theoretical knowledge and research competencies. This initiative will contribute significantly to the future development of the pharmaceutical field.

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Keywords: research-based education, biotechnology research, pharmaceutical faculty.

THE ROLE OF THE ENVIRONMENT IN THE OCCURRENCE OF DEVELOPMENTAL DELAYS IN CHILDREN

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The first 1000 days represent a sensitive period for children's growth and development, having a major impact on the brain's plasticity and its ability to develop based on the child's experiences. The total volume of a child's brain at the age of 1 month is approximately 36% of that of an adult, and this proportion increases rapidly, reaching 72% at the age of 1 year and 83% at the age of 2 years, thus highlighting the accelerated pace of neural development during this critical period. Contributing factors during this period are both genetic and environmental. A high educational level of parents provides a high degree of information regarding healthy nutrition for children, including the adoption of appropriate feeding practices, and the environmental conditions in which a child grows and develops play an important role in early childhood for optimal growth and development. Child development involves multiple areas, such as motor skills, language, cognitive and social skills. Developmental delays in children occur when a child fails to reach one or more of these age-appropriate developmental milestones. Until the present, both types of environment have been examined in various fields, including economics and the assessment of parental educational attainment, in the context of meeting children's needs. Rates of child malnutrition are higher in rural communities than in urban areas. Facilities and infrastructure, such as health and educational services, are more developed in urban settings.

Purpose of the study: to investigate the relationship between living environment and the development of young children within an observational analytical study.

Material and methods: The study involved a retrospective analysis of a sample of 53 children admitted to the Institute of Mother and Child during October–November 2024. The assessment of developmental disorders was performed according to the instructions and criteria established in the Child Development Monitoring Guide. The analysis of the nutritional status of children was performed by reporting weight to length, adjusted for age and sex, for children under 2 years of age, and by using the body mass index (BMI) for children older than 2 years of age. The results were expressed in standard deviations (SDS) and presented according to the graphs and tables recommended by the World Health Organization (WHO), included in the Pocket Guide to Primary Health Care for Children and Adolescents, 2022 edition. Statistical analysis of the data was performed using the statistical programs Office Microsoft Excel and the GraphPad QuickCalcs platform – Contingency Table (2×2).

Results: The sample studied consisted of 53 children, of whom 64.15% (n = 34) were male and 35.85% (n = 19) were female, with a mean age of 25.92 ± 15.77 months. In terms of environment of origin, 58.49% of the participants came from rural areas, and 41.51% from urban areas. The mean BMI value in rural areas was 16.095 ± 1.81 kg/m² (CI: 12.495–19.444), and children from urban areas obtained a BMI value of 15.31 ± 1.73 kg/m² (CI: 11.827–18.08). The comparison of the nutritional status of children from rural and urban areas reveals minor differences in the distribution of weight categories, so in rural areas, 74.19% of children are normal weight, in contrast to 72.73% in urban areas. The percentage of undernourished children is 12.90% in rural areas and 18.18% in urban areas. However, the prevalence of overweight is lower in urban areas, where only 4.54% of children are overweight, compared to rural areas,

where the prevalence of overweight is 9.67%. Cognitive impairment was noted in 60.37% of children, suggesting a high prevalence of cognitive disorders in this group of children. The comparison of the cognitive status of children from rural and urban areas revealed major discrepancies in the distribution of cognitive development types, so in rural areas, 54.84% of children had normal cognitive development, while 45.16% were diagnosed with cognitive disorders. In contrast, in urban areas, only 18.18% of children had normal cognitive development, and 81.82% of children had delays in cognitive development, and this correlation was statistically significant (*p value 0.0072, chi-square 7.228*). Regarding the relationship between living environment and motor skills, in rural areas, 67.74% of children had normal fine motor skills, while 32.26% had difficulties in this area. In urban areas, 63.64% of children had normal fine motor skills, and 36.36% had difficulties. These data suggest a higher prevalence of normal fine motor skills in rural areas compared to urban areas, but they are not statistically significant (*p value 0.7558, chi square 0.097*). Regarding gross motor skills, in rural areas, 45.16% of children had normal gross motor skills, while 54.84% had difficulties in developing them. In contrast, in urban areas, 63.64% of children had normal gross motor skills, and 36.36% had deficiencies. This suggests a higher prevalence of normal gross motor skills in urban areas compared to rural areas, which is not statistically significant (*p value 0.1843, chi square 1.763*). Expressive language was similar between the two environments of origin, being assessed as normal in 54.84% of children from rural areas and 54.55% in urban areas, but there was no statistically significant correlation (*p value 0.9831*). Regarding receptive language, 61.29% of children from rural areas had appropriate development, compared to 54.55% in urban areas. Receptive language deficiencies were reported in 38.71% of children from rural areas and 45.45% of those from urban areas. The results obtained indicate differences between environments, with a slight tendency favorable to the rural environment in terms of receptive language development, but also without a statistically significant correlation (*p value 0.6234*). Regarding emotional development, 70.96% of children from rural areas presented normal emotional development, compared to urban areas (50%). These results indicate a higher prevalence of appropriate emotional development in rural areas, while in urban areas a significantly higher proportion of children with emotional difficulties is noted (*p value 0.1207, chi square 2.408*). According to the general classification of developmental disorders according to the environments of origin, 61.29% of children from rural areas and 63.63% of those from urban areas were diagnosed with global developmental disorder. Regarding age-appropriate development, 16.21% of children from rural areas had typical development, in contrast to only 4.54% of children from urban areas.

Conclusions: The cognitive development of children in this study varied by living environment, being more frequently affected in urban areas, an aspect confirmed by statistically significant differences. On the other hand, rural areas were associated with a higher prevalence of overweight among children, suggesting possible nutritional imbalances or eating behaviors specific to this environment. Normal development according to age was observed more frequently in children from rural areas, contrary to theoretical expectations regarding the superiority of urban access to educational resources and health services.

Keywords: developmental delays; risk factors; rural and urban environment; young children.

ROLE OF PHYTOCOMPONENTS IN THE PREVENTION AND TREATMENT OF DMVL

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The aim of this research is to analyze and evaluate the impact of phytoprotective solutions in the prevention and treatment of age-related macular degeneration (AMD), a severe ophthalmological condition that affects the retina and ultimately leads to loss of central vision. In the study, the essential pathophysiological mechanisms involved in the development of AMD, such as oxidative stress, chronic inflammation and the angiogenesis process, were investigated, with the aim of identifying the possibility of natural intervention in these pathological processes.

The methodology used included an exhaustive analysis of the existing scientific literature, as well as experimental studies on plant extracts with antioxidant and anti-inflammatory properties. Particular attention was paid to the role of biomarkers, genes and specific proteins in AMD pathology, as well as how phytoprotective solutions can influence the expression of these molecular markers. In addition, the potential to modulate pathological biological responses through natural interventions was sought.

The results obtained demonstrate that certain plant extracts, especially those rich in flavonoids and polyphenols, may have beneficial effects in reducing oxidative stress and inflammation in the retina. These natural compounds contribute to slowing down the progression of AMD, protecting retinal cells from damage. It has also been observed that these remedies can modulate the expression of genes and proteins involved in angiogenesis and cell degeneration, thus having a protective effect on the retinal structure.

The conclusion is that phytoprotective solutions represent a promising option in the prevention and treatment strategy of AMD. However, in order to integrate these solutions into clinical practice, additional clinical studies are needed to confirm their efficacy and long-term safety. These findings suggest the potential to develop more effective complementary therapies, based on natural components, to combat this serious ophthalmological condition.

Keywords: *phytocompounds, retina, age-related macular degeneration.*

ROLE OF PHYTOCOMPOUNDS IN RETINA PROTECTION IN PATIENTS WITH DIABETIC RETINOPATHY

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The aim of this work was to evaluate the effect of phytoprotective solutions in the prevention and management of diabetic retinopathy (DR), a serious complication of diabetes mellitus, characterized by damage to the blood vessels of the retina. In the study, the pathophysiological mechanisms involved, such as oxidative stress, inflammation and angiogenesis, were analyzed to understand how natural solutions can intervene in these processes.

The methods used included a review of the existing scientific literature, as well as experimental studies on plant extracts with antioxidant and anti-inflammatory properties. Biomarkers, genes and proteins associated with DR, as well as genetic networks involved in the pathological process, were also evaluated to identify the therapeutic potential of phytoprotective solutions.

The results indicated that certain plant extracts, such as those rich in flavonoids and polyphenols, can reduce oxidative stress and inflammation at the retinal level, contributing to slowing the progression of retinopathy. It was also observed how these solutions influence the expression of genes and proteins involved in angiogenesis, having the potential to modulate pathological responses.

The main conclusion is that phytoprotective solutions represent a promising approach for the prevention and treatment of diabetic retinopathy, due to their ability to intervene on the main pathophysiological mechanisms. These results support the need for further clinical studies to validate the efficacy and safety of these natural remedies in the management of RD.

Keywords: *diabetic retinopathy, phytoprotective solutions, oxidative stress, angiogenesis, biomarkers.*

ALTERATIONS IN GLUCOSURIA AND GLYCEMIA IN EXPERIMENTAL DIABETES FOLLOWING ADMINISTRATION OF VANN EXTRACT

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Diabetes mellitus is a chronic metabolic disorder characterized by a relative or absolute insulin deficiency, leading to impaired utilization of carbohydrates as a primary energy source. The dysregulation of carbohydrate metabolism is indicated by two essential markers: the presence of glucose in the urine (glucosuria) and blood glucose levels (glycemia). In this context, natural medicine represents a promising complementary approach, utilizing plant extracts with hypoglycemic and antioxidant properties for diabetes management.

The objective of this study was to evaluate the effect of the VANN extract on changes in glucosuria and glycemia in experimental diabetes. The study was conducted on laboratory white rats with alloxan-induced diabetes. The extract was obtained from mulberry leaves (*Morus alba*), walnut leaves (*Juglans regia*), grapevine leaves (*Vitis vinifera*), and walnut epicarp, and was administered daily over a 30-day period. The monitored parameters included blood glucose levels and glucosuria. The VANN extract contains bioactive compounds with antioxidant, anti-inflammatory, and hypoglycemic properties, which are beneficial in managing carbohydrate metabolism disorders. The synergy of these bioactive compounds may support the improvement of the body's condition in experimental diabetes by reducing blood glucose levels, providing protection against oxidative stress, and alleviating systemic inflammation associated with the disease. In the group that received the VANN extract in the context of experimental diabetes, blood glucose levels were reduced by approximately 18% compared to the control group, demonstrating a significant hypoglycemic effect. Additionally, glucosuria was significantly reduced by up to 25%, indicating an improvement in renal filtration processes. In conclusion, the administration of VANN extract has a beneficial effect on blood sugar and glucosuria changes in experimental diabetes. The extract contributes to reducing blood glucose levels, improving insulin sensitivity, and decreasing glucose excretion in urine. These results suggest that the investigated extract may be used as an adjuvant in the early stages of diabetes management.

Acknowledgments: *This study was supported by the research project ("Identification of valuable plant resource forms with multiple uses for valorization in the circular economy" (010102), funded by (ANCD).*

Keywords: *experimental diabetes, glucosuria, glycemia, plant extract, insulin.*

USING THE STEREOTACTIC METHOD FOR NEUROENDOCRINE INVESTIGATION

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The stereotactic method, developed by the English scientists V. Horsley and R. H. Clarke, is one of the most important stages in the development of experimental and clinical neurosurgery. It demonstrates the successful integration of brain anatomy, analytical geometry and neurosurgery, building on the achievements of precision mechanics. The stereotactic method comprises a set of techniques and devices that enable the minimally traumatic implantation of electrodes into the brain. This is based on the prior determination of the coordinates of a specific brain structure and the subsequent insertion of an instrument into the brain. The main methodological principle of the insertion of a stereotactic instrument into the brain is to combine the coordinates of a central nervous system structure, as determined using a stereotactic atlas, with the coordinates of the stereotactic instrument. Using this method ensures strictly localised, low-trauma impact on brain structures, which is essential both in experiments and in clinical practice. However, if we move beyond a purely technical approach and analyse the scientific information obtained using this method, it is worth noting that, in neurobiology, it is not only a highly effective method of brain research, but also a fruitful scientific discipline known as stereotaxis.

By combining precise electrode implantation with controlled destruction, electrical stimulation, and the administration of various pharmacological agents into different brain structures, data was obtained on the localisation of centres that regulate many physiological functions, as well as the peculiarities of their connections with other formations of the central nervous system.

The stereotactic method is often used in neuroendocrinological studies. To increase the accuracy of electrode insertion and localised destruction of the structures that regulate the pituitary-thyroid system, we designed a device that makes it possible to deliver controlled destruction to the hypothalamic structures that regulate the synthesis and secretion of neurohormones. The results of the study using the stereotactic method will be presented in more detail in the report.

Acknowledgments: *This study was supported by the research project 011001 Mechanisms for regulating the organism's homeostasis and health and the elaboration of procedures and measures to maintain it), funded by Institutul de Fiziologie și Sanocreatologie).*

Keywords: *stereotactic method, electrode implantation, pituitary-thyroid system.*

DYNAMICS OF SOME PARAMETERS IN PATIENTS WITH HEPATIT B IN SANATORIAL CONDITIONS

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Viral hepatitis results from inflammation of the liver, caused by a viral infection, and is one of the major public health concerns worldwide. The World Health Organization (WHO) estimated that 1 in 3 people in the world were infected with either HBV or HCV and 1.3 million people died as a result of this disease in 2015, deaths that are increasing every year. Early diagnosis, modern treatments associated with balneo-sanatorial treatment specialized in digestive tract diseases, can reduce the risk of complications and improve the quality of life of people infected with chronic viral hepatitis. This study aims to present the current status upon admission and discharge of patients staying for 18 days at the Codru spa complex, during which testing of physiological parameters in blood serum specific for liver function was performed: ALAT (alanine aminotransferase), ASAT (aspartate aminotransferase), bilirubin and its fractions and the Thymol test.

The purpose of this research was to determine the dynamics of liver samples in patients with chronic viral hepatitis B under conditions of application of balneo-sanatorial procedures.

Research methods include: analysis of medical records, laboratory tests.

110 people with chronic viral hepatitis were investigated. Results with values: increased, slightly increased and normal were obtained.

Thus, the results of blood tests in patients with chronic viral hepatitis B were positive at discharge, where there is a decrease in results with elevated values from 1.5% to 0%, and an increase in results with normal values from 73% to 95%. Namely, at discharge the results with normal values for ALT increase from 73% to 96.82%, and from 68.2% to 95.2% for bilirubin, the values increased from 1.6% at admission decreased at discharge to 0% in both cases, for AST at admission, results with elevated values of 1.6% at discharge decrease to 0%, and the normal values from 73% improve to 95.2% at discharge.

Conclusions: Following the application of balneo-sanatorial procedures, the values of liver samples in patients with chronic viral hepatitis B improve. Sanatorium therapies do not replace specific antiviral treatments, but they contribute to maintaining metabolic balance, reducing symptoms, supporting liver function, reducing inflammation and improving the quality of life of patients with chronic viral hepatitis.

Keywords: *chronic viral hepatitis, sanatorial, liver, parameters, dynamics, procedures.*

INTEGRATION OF GENOMICS, PROTEOMICS AND METABOLOIBICS FOR HEALTH STATUS ASSESSMENT: A SYSTEMATIC APPROACH

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Modern healthcare systems are increasingly challenged by population aging, the growing burden of chronic diseases, multimorbidity, polypharmacy, and the rising pressure on medical resources. In this context, traditional reactive and protocol-driven medical approaches prove insufficient.

This study proposes a transition towards predictive, preventive, and personalized medicine through the integration of omics sciences—genomics, proteomics, and metabolomics—within a systemic biology framework.

We highlight the importance of systemic analysis in understanding health and disease as dynamic states emerging from complex biological networks. Omics data, when integrated via advanced bioinformatics, mathematical modeling, and artificial intelligence (AI), provide valuable insights into genetic predispositions, molecular dysfunctions, and biochemical imbalances, enabling early diagnosis, targeted therapies, and more effective health monitoring.

This study outlines a multi-level integration model relevant to the context of the Republic of Moldova, focusing on how omics-based systemic evaluation can support epidemiological profiling, risk stratification, and resource optimization.

We also review key technologies (NGS, mass spectrometry, machine learning) and propose strategic directions including the development of national bioinformatics infrastructure, cross-disciplinary consortia, and genomic registries.

Our conclusions emphasize that systemic medicine, empowered by omics integration, is not merely a future perspective, but a clinical and public health necessity in addressing the complex challenges of chronic diseases in the 21st century.

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Keywords: *systems medicine, genomics, proteomics, metabolomics, chronic diseases, bioinformatics, predictive medicine, Moldova.*

SUNFLOWER POLLEN AS A NATURAL SOURCE OF ANTIOXIDANTS AND ITS THERAPEUTIC POTENTIAL

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Sunflower (*Helianthus annuus* L.) pollen plays a significant role in multiple domains, including ecology, nutrition, and medicine. He is rich in proteins, essential amino acids and bioactive compounds, making it a valuable dietary supplement for both humans and animals. Sunflower pollen is a valuable source of bioactive compounds with antioxidant activity, with promising applications in human nutrition, medicine and apiculture. The main antioxidants identified include flavonoids (*quercetin*, *kaempferol*), carotenoids (*β -carotene*, *lutein*), vitamins C and E, polyphenols, glutathione and melatonin.

These compounds are contributing to neutralize free radicals and protect cellular DNA by reducing oxidative stress. They also help maintain the health of bee colonies by increasing their resistance to biological and chemical stressors and pathogens. The carotenoids contained in sunflower pollen are natural pigments that support immune functions and prevent the occurrence of degenerative diseases. Water-soluble antioxidants such as vitamin C are essential in tissue repair and collagen production. Vitamin E protects cell membranes by preventing lipid peroxidation and helps against cardiovascular disease. Glutathione plays a crucial role in the regeneration of other antioxidants, such as vitamin C and E. Melatonin is the compound most associated with circadian rhythm regulation, but also with antioxidant effects. Therefore, the organic compounds present in sunflower pollen have protective effects on human health by reducing the risk of chronic diseases, including cardiovascular and neurodegenerative disorders and various forms of cancer.

Due to its complex bioactive profile, sunflower pollen is a valuable candidate for the development of functional products and natural food supplements. Its rich content in antioxidants, polyphenols, flavonoids, and essential micronutrients supports its potential applications in human nutrition, preventive medicine, cosmetology, in particular in preparations aimed at reducing oxidative stress, sustaining immune function and promoting skin health.

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Keywords: *Helianthus annuus* L., pollen, antioxidants, oxidative stress, therapeutic potential.

ASSESSING SELF-IMAGE LEVELS IN ADOLESCENTS WITH FOOD INTOLERANCE

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The last two decades are marked by an increase in the number of children diagnosed with food intolerances in our country. The fermentative insufficiency affects unfavourably the breakdown of certain nutrients, such as gluten, lactose, casein, etc. By identifying the bio-psycho-social aspect of food intolerances and finding out the real possibilities of recovery of the health status of food intolerant children, strictly following a dietary regimen without certain nutrients, it will be possible to find ways for their integration. In order to elaborate informational and developmental programs for the recovery and integration of food intolerant children in our country, we propose to estimate the current state and existing problems, starting with the evaluation of the self-concept, self-image, which leaves its mark on the physical and cognitive development of food intolerant children. Of primary interest is the physical self-image, self-acceptance of one's own physical conditions, awareness of one's own nutritional specificity, the search for and finding the solutions that are indispensable to life. The present study is applied, interdisciplinary, intersecting with several fields. According to the usefulness and applicability of the obtained results to the conditions of the current state of children with food intolerances, this study is innovative and developmental. In order to assess the state of self-concept in children with food intolerances in our country we examined the level of self-image using the questionnaire method. We selected the "Questionnaire on self-image", which contains 41 items with 8 dimensions (123p.) and it was administered to 12 food intolerant adolescents aged 14 - 16 years, who constituted the experimental group (EG). 15 food intolerant adolescents of the same age were interviewed for the control group (CG). We are primarily interested in determining the level of physical self-image in adolescents with food intolerance, later compared with the manifestation of the same characteristics in food intolerant adolescents. Both groups fall in the medium (70-100 p.) level II of total self-image. We can conclude that for the group of adolescents with food intolerance (GE), the analyzed indicators have lower mean values than the control group (GC), their non-food intolerant peers. Thus, the level of total self-image is 10.2 points lower, constituting 10%, and the level of physical self-image is also lower than in the control group, constituting 7 points and 8.36 points respectively, so it is 16% lower.

Following the data processing and analysis, which elucidates the current level of self-acceptance, a training program in gluten-free or lactose-free dietary nutrition and another program for personal development will be developed for adolescents with food intolerances.

Keywords: *food intolerance, recovery, integration, questionnaire.*

ON THE ROLE OF NUTRITIONAL FACTORS IN THE DEVELOPMENT OF THE MEMBRANE DIGESTION SYSTEM IN THE SMALL INTESTINE

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The aim of this study is to assess the current understanding of the role of nutritional factors in the development of the membrane digestion system in the small intestine during early postnatal ontogenesis, based on a comprehensive review of the specialized literature.

According to the analysis, it is now well established that nutritional factors, alongside ontogenetic developmental processes, play a critical role in the formation of digestive enzyme systems in the stomach, pancreas, and small intestine during the transition to definitive nutrition. These factors significantly influence the condition of the digestive tract and the individual's health later in life. However, the specific features and mechanisms of adaptive remodeling of membrane digestion in response to nutrients during early postnatal development remain poorly understood. Studies in animal models have shown that interactions between dietary components and the membranes of intestinal microvilli profoundly affect intestinal development and postnatal adaptation.

Recent findings indicate that nutritional signals from the intestinal lumen are detected by specialized receptors on endocrine cells, which in turn trigger changes in the synthesis and secretion of gastrointestinal hormones and growth factors—such as glucagon-like peptide-1 (GLP-1) and glucose-dependent insulintropic peptide (GIP)—that directly regulate enzymatic activity. Intestinal neurons are also involved in transmitting signals from endocrine cells to enterocytes. The impact of the macronutrient composition of the diet on adaptive changes in carbohydrate and protein membrane digestion during early postnatal ontogenesis remains insufficiently explored and is the subject of ongoing debate.

Thus, due to its evident relevance to healthcare and dietetics, and the current gaps and controversies in understanding, the issue of how nutritional factors influence the formation of the membrane digestion system in the small intestine during early postnatal development requires further in-depth investigation.

Keywords: *nutritional factors, membrane digestion, small intestine, early postnatal ontogenesis*

MODEL OF PHYSIOLOGICAL MONITORING FOR EARLY SIGNS OF INFO-DIGITAL ADDICTION IN CHILDREN

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The adverse impact of the Information-Digital Environment on psychophysiological health, especially among children and adolescents, is becoming increasingly evident. A distinctive feature of Info-Digital Addiction (IDA) is its gradual and often asymptomatic development. Children may not recognize signs of digital stress, such as fatigue, irritability, or disrupted sleep, and adults—whether caregivers or professionals—may also overlook these early signals in both children and themselves. This study aims to propose a model of physiological monitoring focused on identifying early signs of IDA in children using objective physiological and behavioral parameters. While the model is child-centered, its core logic is also relevant for broader populations exposed to digital overstimulation.

Drawing on a review of current scientific literature (PubMed, Scopus, Google Scholar), the model incorporates heart rate variability (HRV), sleep quality, circadian stability, physical activity, and behavioral indicators like reduced engagement or emotional dysregulation. These can be tracked non-invasively using wearable devices and structured questionnaires, supported by parental or teacher observations. The framework is designed for everyday use—in family and educational environments—with the goal of identifying at-risk children before overt symptoms appear. It also supports the creation of personalized strategies for behavioral adjustment and self-regulation. In addition to empowering parents and clinicians with earlier awareness, it contributes to the development of digital literacy and self-monitoring skills in children. By shifting from reactive responses to proactive physiological awareness, the model has preventive potential. It also opens pathways for digital integration into educational settings, telemedicine, and public health platforms. Given the scarcity of validated early detection tools for IDA—apart from self-report measures such as K.Young’s questionnaire—this work addresses a critical gap and offers a foundation for further physiological research focused on childhood and adolescence.

Acknowledgments: *This study is part of an individual doctoral research project conducted within the Doctoral School of Natural Sciences, Moldova State University*

Keywords: *Info-Digital Addiction, children, physiological monitoring, early detection, heart rate variability, sleep quality, behavioral indicators, wearable devices*

**DROSOPHILA AS A MODEL FOR THE STUDY
OF NEURODEGENERATIVE DISORDERS**

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For many years *Drosophila* has been used as a model organism in biomedical research to study a broad range of human diseases. The high degree of genetic conservation coupled with low genetic redundancy make this model particularly well suited for studying the function of disease causing genes. Numerous neurodegenerative diseases including Alzheimer's disease, Parkinson's disease, Huntington's diseases, Amyotrophic Lateral Sclerosis and others have now been successfully modelled in *Drosophila*. Among these pathologies, cognitive disorders are mental conditions characterized by impaired perception, reasoning, memory and judgment. Behavioral repertoire and powerful fruitfly genetics open up perspectives to define the molecular pathways that underlie some of the most mysterious of all human diseases. Studies in *Drosophila* will accelerate our understanding of the pathogenesis of these diseases, and to provide new therapeutic targets.

THE IMPACT OF INORGANIC ARSENIC EXPOSURE ON ANXIETY-LIKE BEHAVIOR IN ZEBRAFISH (*DANIO RERIO*): INSIGHTS FROM THE NOVEL TANK TEST

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Inorganic arsenic, particularly in the form of arsenic acid (H_3AsO_4), is a widely spread environmental pollutant that has well-documented toxic effects on aquatic organisms, including the induction of anxiety. The Novel Tank Test (NTT) is a well-established behavioral assay used to evaluate anxiety-like responses in zebrafish (*Danio rerio*). This study investigated the effects of chronic exposure to inorganic arsenic on anxiety-related behavior in adult zebrafish. Fish were exposed to 10 $\mu\text{g/L}$, 50 $\mu\text{g/L}$, and 300 $\mu\text{g/L}$ inorganic arsenic for 21 days and subsequently subjected to the NTT. Behavioral parameters including time spent in the top zone, latency to enter the top zone, number of transitions between zones, and freezing duration were quantified using automated video tracking. Exposure to inorganic arsenic induced dose-dependent behavioral changes indicative of altered anxiety states. These findings suggest that inorganic arsenic disrupts normal exploratory behavior and increases anxiety-like responses, with the NTT providing a sensitive platform for assessing sublethal neurobehavioral toxicity in zebrafish.

Acknowledgments: This study was not supported by any research project and did not receive external funding.

Keywords: zebrafish, inorganic arsenic, anxiety-like behavior, Novel Tank Test, neurotoxicity.

PROMOTING CIRCADIAN ACTIVITY AND EATING BEHAVIOR BY THE ENVIRONMENT DESIGN

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The most powerful zeitgebers (time cues) from the external environment that influence our internal circadian rhythms are sunlight and ambient temperature. In addition, sleep and meal timing, physical activity, social interactions, and work-rest schedules play a determinative role. The internal circadian clock serves as a fundamental coordinator of all biological processes, ensuring they occur in a precise temporal sequence. This coordinating function is based on the activation of the expression of thousands of so-called clock genes, which turn on and off in a strictly defined order. As a result, metabolic processes related to the absorption and breakdown of macro- and micronutrients – essential for restoration, growth, development, and reproduction – are carried out at precisely scheduled times. A phase shift in the biological rhythm or desynchronization of cyclic phenomena in the external environment with the internal biological clock can have a powerful pathogenic effect. For example, during the active phase of the circadian cycle, energy expenditure increases, leading to greater intake of food and water, while actively functioning organ systems and tissues are prepared to receive, process, and absorb nutrients. It is evident that for the coordinated functioning and adequate blood supply of the liver, stomach, small intestine, and pancreas, precise synchronization (tuning) of the internal biological clock is essential. Measures aimed at optimizing our daily habits to balance the interactions between environmental factors, activity, and the homeostatic factors of the internal environment lead to improvements in the quality and quantity of sleep, alertness, attention, and responsiveness during subsequent wakefulness, metabolism, and overall health.

The results indicate that after a period of wakefulness, during the sleep period under conditions of physiological rest – with a natural light cycle (from 08:00 to 20:00) and normal feeding behavior using a standard diet – the laboratory animals exhibited increased motor activity only during feeding behavior and after the intake of food and water, as well as during grooming.

This episodic increase in motor activity was caused by the scheduled refilling of the feeder and water dispenser, as well as the animals' agitation related to bedding replacement. The results also show that during the wakefulness period (the dark phase), an increase in motor activity of the experimental animals – as recorded using actigraphy (actograms) – is observed as an increase in oscillation amplitude up to 800 ± 56 units or more (according to averaged values recorded over epochs lasting 2 hours (120 minutes). Therefore, during the daily wake-sleep and feeding-fasting cycles, episodes of heightened motor activity are observed primarily during the dark period (from 21:00 to 07:00). Thus, the time of day most suitable for sleep and rest (the "sleep window") arises as a result of the combined influence of diurnal environmental, circadian rhythm, and homeostatic factors. Sleep pressure within the sleep window is highest at the beginning and during the first half of the night. It then gradually decreases as the homeostatic drive for sleep dissipates toward the end of the night.

Acknowledgments: *This study was supported by the research project "The role of the orexinergic system of the brain in the regulation of the wake-sleep cycle and eating behavior" (doctoral project), funded by the National Agency for Research and Development.*

Keywords: *circadian rhythm, actigraphy, eating behavior, environment.*

ULTRASOUND ASSISTED EXTRACTION AND QUANTITATIVE DETERMINATION OF POLYPHENOL COMPOUNDS IN SPECIES OF THE GENUS *HELICHRYSUM*

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Phenolic compounds are essential for human health and exhibit a wide range of pharmacological activities. Medicinal plants of the g. *Helichrysum* (*H. arenarium* and *H. italicum*) can serve as a source of phenolic compounds. The aim of our study was to quantify polyphenolic compounds in plant products of *Helichrysum species* (leaves, aerial parts, flowers, stems), using the alternative extraction method. Polyphenols may degrade during extraction due to high temperature or oxidizing conditions. One of the alternative methods is ultrasound-assisted extraction, applied for its high content and efficiency of results. The total phenolic content (TPC) was determined using Folin-Ciocalteu reagent with the absorbance read at wavelength $\lambda=760$ nm at Metertech UV/VIS SP 8001 spectrophotometer, reported as gallic acid equivalent (mg GA/g). Following the evaluation of the results in ethyl extracts, it was found that the highest TPC in *H. arenarium* species was identified in leaves – 44.11, followed by flowers – 43.35, aerial parts – 38.75, stems – 23.48; when in *H. italicum*, the lower values were recorded ranging from 36.35 in leaves, in flowers – 28.45, aerial parts – 24.31 to 15.89 in stems (mg GA/g). In conclusion, extraction methods influence the content of TPC in plant products, and ultrasound assisted extraction can serve as an alternative method for the extraction of polyphenolic compounds with insignificant deviations in products for both species of *Helichrysum*. Extraction methods influence the content of TPC in products, and ultrasound assisted extraction can serve as an alternative method for the extraction with insignificant deviations in the leaves, aerial parts, flowers, stems.

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Keywords: *Helichrysum sp.*, ultrasound assisted bath, polyphenol compounds.

**QUANTITATIVE DETERMINATION OF CHLOROPHYLL A AND B IN
HERBAL PRODUCT OF *HELICHRYSUM* SPECIES**

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Chlorophylls are a group of natural pigments responsible for the green color of plants, and divided into chlorophyll a and chlorophyll b, which account for about 99% of the chlorophyll species found in plants. Chlorophylls are one of the most important bioactive compounds with plentiful beneficial effects on human health through their anti-inflammatory, anti-cancer, and high antioxidant activity. Our objective was the quantitative determination of chlorophyll pigments in plant products harvested from species of the genus *Helichrysum*: *H. arenarium* and *H. italicum* (leaves, aerial parts, flowers). Determination of chlorophyll a and b was performed spectrophotometrically (mg/l), with extraction of chlorophyll pigments in 60% and 96% ethyl alcohol, using a Metertech UV/VIS SP 800 spectrophotometer, at the following wavelengths: chlorophyll a - 664 nm, chlorophyll b - 649 nm. In agreement with the results we can conclude that content of chlorophyll a pigments in herbal products, shows a higher concentration in leaves (*H. arenarium*-3,16; *H. italicum*-2,81), followed by flowers (*H. arenarium*-2,57; *H. italicum*-2,08) and aerial parts (*H. arenarium*-2,29; *H. italicum*-2,09). Chlorophyll b showed a higher bioavailability in *H. arenarium*, followed by lower concentrations in *H. italicum*, with a higher leaf content (*H. arenarium*-2,27; *H. italicum*-1,97) by extraction with 96% alcohol, followed by aerial parts, flowers, whereas extraction of chlorophyll pigments in 60% ethyl alcohol shows a lower content. Thus, we can recommend 96% ethyl alcohol for chlorophyll extraction and determination in herbal products.

Acknowledgments: This study was supported by the research project *Impact of different habitats and abiotic stress factors on plant metabolites of genus Galium and Helichrysum*, project no. 17ROMD, funding organization UE Fiscdi.

Keywords: *Helichrysum* sp., chlorophylls, herbal products, spectrophotometry.

EFFECT OF RISPERIDONE IN MODULATING AGGRESSIVE AND ANXIOUS BEHAVIOR IN A ZEBRAFISH MODEL OF AUTISM

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Autism spectrum disorder has a high percentage of diagnoses from year to year. Also, the range of environmental factors that cause symptoms becomes more widespread around members of society. Among the chemical factors underlying the causes of ASD are valproic acid, which is common in the composition of anticonvulsants and state stabilizers and induces communication difficulties, repetitive behavior, aggression **and locomotors. Thus, the purpose of the study is to know the effect of valproic acid on aggressive and anxious type in the animal model of zebrafish.

Also, ASD-type symptoms do not have a well-defined and approved drug. Thus, over time, several substances have been tested to verify their potential as a therapeutic agent. Numerous studies in patients and animal models have shown beneficial effects on ASD symptoms due to its neuromodulators effect. Approved by the FDA as a drug to calm aggression and irritability, the study aims to know the effect of risperidone on aggressive zebrafish behavior in the context of simultaneous valproic acid and risperidone administration on the anxious behavior of zebrafish, but also separately. For this study, the first step was to randomly select individuals and divide them into four experimental groups (n=10) such as: control; 200 μ M VPA; 170 μ M RIS and 200 μ M VPA and 170 μ M RIS. Accommodation in experimental aquariums was carried out for 5 days. During the experimental period, three sessions of behavioral evaluation of groups (mirror aggression test and novel diving test) were conducted.

The aggressive behavior associated with ASD following exposure of zebrafish to valproic acid has been recorded and statistically validated. Also, the activity of the experimental groups in the behavioral tests presented a series of significant changes of the main parameters chosen for analysis.

Keywords: autism; zebrafish; aggressivity; anxiety; valproic acid; risperidone

IDENTIFICATION OF HUMAN PAPILLOMAVIRUS (HPV) GENOTYPES

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Human Papillomavirus (HPV) infection is one of the most common sexually transmitted infections and the main cause of cervical cancer. This study aimed to determine HPV genotype prevalence in women undergoing routine screening and correlate virological data with cytology results.

This observational study was conducted over a one-year period (January 15, 2024 – February 15, 2025) at the DDL laboratory of IMSP SCM "Sfânta Treime" in Chişinău. Biological samples, including urogenital swabs and cytology (Pap smears), were collected from 200 women aged 17 to 60 years. Participants underwent BM 45 and BM 83 HPV genotyping tests and the Babeş-Papanicolau test as part of routine screening or following medical recommendation. The laboratory processes over 1,000 patients annually from various regions across Moldova, allowing the study results to reflect national prevalence trends.

Of the 200 women tested, HPV was detected in 128 cases (64%), while 72 (36%) had no evidence of viral presence. The most frequently detected genotype was HPV 31 (21.9%), followed closely by HPV 16 (20.3%), HPV 18 (9.4%), and HPV 45 (7.8%). HPV-positive rates were highest in the 17–29 age group (40.6%), followed by 30–39 years (36.7%) and 40+ years (22.7%), confirming the correlation between age and infection prevalence, particularly among sexually active young women.

The combination of HPV testing and cytology (Pap smear) offers a comprehensive assessment of cervical pathology. Cytological grading was classified as NILM, ASC-US, LSIL, and HSIL, based on the Bethesda System. The presence of high-risk HPV genotypes increased proportionally with lesion severity. For example, HPV 16 was present in 36.7% of LSIL cases and 30% of HSIL cases.

The findings of the present study align with global data indicating HPV 16 and 31 as leading oncogenic genotypes. HPV 16 remains the most aggressive genotype, commonly associated with high-grade lesions (HSIL) and a higher risk of progression to cervical cancer. A notable proportion of infections were mixed, involving two or more genotypes, especially among ASC-US and LSIL cases.

Age remains a major risk factor, with young women showing higher prevalence, likely due to increased sexual activity and lower immune response to viral clearance. Over time, the risk of persistence rises, increasing the probability of neoplastic transformation, especially for high-risk genotypes.

Keywords: *Human Papillomavirus, genotypes, screening, oncogenic risk.*

**ACUTE COMBINED EXPOSURE TO ARSENIC AND AMPICILLIN
ALTERS LOCOMOTOR AND SOCIAL BEHAVIOR IN ZEBRAFISH
(*DANIO RERIO*)**

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In aquatic environments, chemical contaminants, such as heavy metals and antibiotics, do not occur individually, but in mixtures, which can lead to synergistic or additive toxic effects on exposed organisms. In this context, the present study investigated the acute effects of exposure to 50µg/L arsenic, 100mg/L ampicillin, and their mixture (50µg/L arsenic + 100mg/L ampicillin) on the locomotor and social behavior of zebrafish (*Danio rerio*). The evaluation of swimming performance parameters revealed significant decreases in total distance moved (cm) and velocity (cm/s) in the exposed groups compared to the control group, indicating possible neurotoxic effects and stress-related behaviors. In the sociability test, treated individuals spent significantly less time in the arm associated with the social stimulus, suggesting a decrease in social interactions. Also, the combined exposure caused an amplification of the negative effects observed, suggesting a synergistic interaction between the two substances. These results highlight the ecotoxicological risks generated by the simultaneous presence of emerging contaminants in aquatic ecosystems and the need for rigorous monitoring of these compounds in the environment.

Acknowledgments: This study was not supported by any research project.

Keywords: arsenic, ampicillin, neurobehavioral toxicity, sociability, ecotoxicology, emerging contaminants.

DIETARY REGULATION OF MICROBIOTA-DERIVED HISTAMINE AND BARRIER FUNCTION IN A PEDIATRIC PATIENT WITH SINGLE VENTRICLE PHYSIOLOGY

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This case study describes a targeted nutritional intervention in an 8-year-old pediatric patient with a history of complex congenital heart disease and single ventricle physiology post-Fontan procedure. The main objective was to modulate the gut-barrier-inflammation axis by applying a tailored diet (free from gluten, dairy, sugar, and ultra-processed foods), combined with prebiotic, probiotic, and phytotherapeutic supplementation. Methods involved longitudinal monitoring of intestinal biomarkers, microbiota profiling, and documentation of supplement intake. Biomarker data were collected at multiple time points during the nutritional intervention: 12.07.2023, 26.01.2024, 01.03.2024, and 01.04.2024. Key biomarkers analyzed included Zonulin (e.g., 114.75 ng/mL, 120.75 ng/mL, 93.2 ng/mL), secretory IgA (e.g., 2526 µg/g, 4745 µg/g), beta-defensin (e.g., 332.46 ng/g, 120.28 ng/g, 131.29 ng/g), and fecal histamine (e.g., 4571.6 ng/mL, 3112.3 ng/mL, >24000 ng/mL, 598.2 ng/mL). All analyses were conducted at an accredited laboratory using ELISA (Enzyme-Linked Immunosorbent Assay) methodology for quantitative determination in fecal samples. Supplement intake and dietary compliance were documented and adjusted based on response markers. Microbiota analysis initially showed severe dysbiosis with overgrowth of histamine-producing strains (*Escherichia* spp., *Klebsiella* spp.) and depletion of beneficial species (*Akkermansia muciniphila*, *Faecalibacterium prausnitzii*). Within four months, there was a marked reduction in inflammatory markers, with fecal histamine decreasing from over 24,000 ng/mL to 598.2 ng/mL, beta-defensin levels trending downward toward normal range. Nutritional and microbial modulation led to gradual decrease in pro-inflammatory activity. Personalized anti-inflammatory dietary intervention targeting microbial activity and intestinal permeability may represent an effective strategy to improve immune and gut function in pediatric patients with Fontan physiology and cardiometabolic vulnerability.

Acknowledgments: *This work was conducted independently without external funding or sponsorship*

Keywords: *pediatric microbiota, Fontan physiology, fecal histamine, Zonulin, inflammation, dietary therapy.*

INTEGRATING qPCR-HRM AND mtDNA SEQUENCING IN MITOCHONDRIAL DISEASE DIAGNOSIS

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Mitochondrial diseases, with an estimated prevalence of 1 in 4,300 individuals, are among the most common inherited metabolic disorders. These diseases result from defects in the mitochondrial genome (mtDNA) or nuclear genes that affect oxidative phosphorylation, leading to impaired energy production. Their clinical heterogeneity and progressive nature underscore the need for advanced molecular techniques for accurate diagnosis and management.

This study aimed to evaluate a tiered molecular approach combining high-resolution melting (qPCR-HRM) screening and targeted mtDNA sequencing to improve diagnostic yield in patients with suspected mitochondrial disease.

Materials and Methods. Patients were selected based on clinical suspicion of mitochondrial pathology and scored using the Nijmegen Mitochondrial Disease Criteria. All patients underwent molecular screening with a custom qPCR-HRM assay targeting 7 common mtDNA point mutations. In patients with high Nijmegen scores or positive HRM profiles, targeted mtDNA sequencing, focusing on coding genes, was performed. Bioinformatic analysis annotated variants and assessed pathogenicity; clinical, biochemical, and molecular data were integrated and summarized using descriptive statistics for genotype–phenotype correlations.

Results. qPCR-HRM screening revealed the presence of well-established mtDNA mutations in 8 patients, including m.3243A>G (n=3), m.8993T>G (n=2), m.3460G>A (n=2), and m.11778G>A (n=1). Additionally, targeted sequencing of the mtDNA coding region was performed in a cohort of 90 patients, including those 8 with positive HRM profiles, identifying 32 individuals with variants that correlated with their clinical manifestations and biochemical profiles, reinforcing their potential diagnostic significance in mitochondrial diseases.

Conclusions. A combined qPCR-HRM and targeted mtDNA sequencing approach enabled a genetic diagnosis in 35.5% of sequenced patients. This tiered, cost-effective strategy facilitates early molecular detection and improves diagnostic accuracy in clinically and genetically heterogeneous cases.

Acknowledgments: This study was supported by the institutional research project „Diagnosis and Monitoring of Genetic Diseases in the Prevention of Maternal and Child Health Disorders (140102, DiMoGEN)”.

Keywords: mitochondrial DNA, qPCR-HRM, targeted sequencing, mtDNA mutations, mitochondrial disease.

CURRENT UNDERSTANDINGS OF THE IMPACT OF LIFESTYLE FACTORS ON THE PRESERVATION OF COGNITIVE FUNCTION IN AGING

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According to sanocreatology, mental health is determined by lifestyle factors by more than 50%, and the implementation of the genetic program that determines it is carried, mainly under the influence of environmental factors (Furdui T., Ciochina V. et al., 2018). Over the past decade, the number of studies on cognitive function in aging has increased more than sixfold compared to the previous decade. This surge is largely due to the rising number of individuals with dementia, which has become the fifth leading cause of disability and premature death among older adults. At the same time, research into the mental health of the elderly, particularly long-livers, in relation to lifestyle remains scarce. The aim of the present study is to determine the extent to which the influence of lifestyle factors on cognitive aging has been investigated, based on a comprehensive analysis of contemporary literature.

According to current scientific perspectives, lifestyle factors that promote healthy cognitive aging should focus on both preventing loss and enhancing brain reserve (the brain's "hardware," including the number of neurons and synapses) and cognitive reserve (the ability to efficiently use brain networks and cognitive strategies for daily functioning and in response to cerebral challenges). A strategy to increase brain and cognitive reserves should include lifestyle elements such as regular physical activity; cognitive-stimulating activities aimed at preventing obesity and metabolic syndrome; protection of the brain from injury; a diet that helps prevent cardiovascular diseases; smoking cessation and limited alcohol intake; avoidance of factors that provoke excessive or chronic stress; optimal sleep duration; and addressing sensory impairments. Nevertheless, some studies have failed to find strong evidence that lifestyle factors help preserve cognitive function during aging. Due to this, and the limited number of controlled studies on the topic, several reports from governmental and medical institutions have concluded that the available evidence is currently insufficient to support specific clinical recommendations.

Given the high importance and ongoing debate surrounding this issue, one promising direction is the expansion and deepening of comparative studies on the mental health and lifestyles of relatively healthy long-livers residing in different regions, each with its own ecological and other characteristics, as well as distinct hereditary traits. Such research could help identify factors that promote cognitive longevity and reveal the mechanisms through which they operate.

Keywords: *lifestyle factors, cognitive functions, mental health, aging, centenarians*

OPTIMIZATION OF THE NUTRIENT MEDIUM FOR LACTIC ACID BACTERIA USING *ARTEMISIA ABSINTHIUM* INFUSION

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Currently, Lactic Acid Bacteria (LAB) offer interesting research opportunities, and researchers' efforts are aimed at evaluating different substrates for the multiplication of these bacteria and/or their valuable metabolites.

Previously, among the forms of preparation – decoction, infusion, alcoholic tincture and cold maceration – prepared from wormwood (*Artemisia absinthium*), regarding the degree of multiplication of some representatives of the normal microbial flora, the two most effective forms of preparation were selected: infusion and tincture. Since a more pronounced performance of the wormwood infusion was found, it formed the basis for the development of a new nutrient medium based on the one used for the growth and multiplication of LAB. The multiplication capacity of 4 strains of LAB, isolated from the intestinal contents of rats, was tested using 4 variants of the nutrient medium based on wormwood infusion, compared to the known one. The process of preparing the nutrient medium Lactobacillus MRS Agar consists of suspend 67.15 grams in 1000 ml purified/distilled water, heat to boiling to dissolve the medium completely, sterilize by autoclaving at 15 lbs pressure (121° C) for 15 min (control). While in the four proposed nutrient medium variants, 50; 75; 100 and 125 ml of distilled water were substituted by the same volume of wormwood infusion per 1 liter of medium, while respecting the same sterilization regime. The results obtained show that the accumulation of LAB biomass was higher when cultivated on nutrient medium in variant no. 2 for *Lactobacillus lactis* strains, and in variant no. 3 for *Lactobacillus plantarum* strains. On the nutrient medium MRS, the biomass accumulation of *Lactobacillus lactis* strains during incubation for 24 hours at a temperature of $(37\pm1)^{\circ}\text{C}$ was 0.81-0.98 g/100 ml, while on the proposed medium this accumulation was 0.94-1.21 g/100 ml. Thus, the increase was 16.04 and 23.46%, respectively. This trend continued after 72 hours of incubation, when the amount of biomass accumulated on the proposed nutrient medium was 19.18 and 22.64% higher, compared to the MRS medium. The biomass accumulation of the 2 strains of *Lactobacillus plantarum* strains after 72 hours of incubation also increased by 22.58 and 24.56% respectively compared to the control.

Thus, despite the antimicrobial activity of wormwood essential oils against various types of microorganisms, the infusion of this plant, being added to the composition of the known nutrient medium, exhibits a prebiotic effect, stimulating the process of multiplication of LAB, which allows to accumulate the biomass necessary for the future preparation of microbial preparations based on indigenous medicinal plants.

Keywords: nutrient medium, lactic acid bacteria, wormwood infusion, biomass

**INFLUENCE OF *STREPTOMYCES MASSASPOREUS* CNMN-Ac-36
BIOMASS CULTIVATED ON A NUTRIENT MEDIUM ENRICHED WITH
CYANOBACTERIAL METABOLITES ON THE REPRODUCTIVE
PERFORMANCE OF WHITE RATS**

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The aim of this study was to investigate the effects of long-term consumption of biomass from the *Streptomyces massasporeus* CNMN-Ac-36 strain, isolated from soil in central part of the Republic of Moldova and cultivated on a nutrient medium supplemented with metabolites of the cyanobacterium *Spirulina platensis*, on the reproductive performance of white rats.

The study was conducted using Wistar rats. Both male and female rats were divided into two experimental groups and one control group: the control group received a standard diet; experimental group BM1 received a standard diet supplemented with biomass of the *Streptomyces massasporeus* CNMN-Ac-06 strain cultivated on a complex nutrient medium R; and experimental group BM2 received the same standard diet supplemented with biomass of the *Streptomyces massasporeus* CNMN-Ac-06 strain cultivated on a nutrient medium containing 0.1% BioR, a preparation derived from *Spirulina platensis* biomass. The animals were fed these diets for 90 days. Female rats were placed with males for two estrous cycles.

The results showed that the number of newborn pups per litter increased by 26.8% in BM1 and by 45.7% in BM2 compared to the control group. Although the body weight of newborn pups in the experimental groups was slightly lower than in the control group, these differences were not statistically significant. By the time of sexual maturity, the body weight of offspring from group BM2 slightly exceeded that of the control group. Postnatal mortality after 3 weeks was lower in both experimental groups, with statistically significant differences observed between BM2 and the control group. The pregnancy index, gestation duration, and maternal behavior in females from the experimental groups did not differ from those in the control group.

In conclusion, consumption by white rats of biomass from the *Streptomyces massasporeus* CNMN-Ac-06 strain, particularly when cultivated on a nutrient medium containing 0.1% BioR, led to an increase in litter size and a reduction in postnatal mortality. Observations of the offspring in both experimental groups showed physiological development, viability, and weight gain consistent with normal developmental timelines.

Keywords: reproductive performance, *Streptomyces massasporeus*, biomass, *Spirulina platensis*, cyanobacterial metabolites

ANALYSIS OF BEHAVIORAL TOXICITY OF TARTRAZINE USING THE *Danio rerio* ANIMAL MODEL

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Tartrazine (E102) is a synthetic yellow azo dye widely used in the food, pharmaceutical, cosmetic and textile industries to color products. Approximately 65% of azo dyes are food additives, with tartrazine being one of the most widely used globally, despite having no nutritional value. Although approved for human consumption, studies have raised concerns about possible adverse effects, such as allergic reactions and behavioral changes, especially in children. In this study, we evaluated the toxicological and behavioral effects of tartrazine on zebrafish (*Danio rerio*), a model organism frequently used in neurotoxicity testing. Fish were exposed to six different concentrations of tartrazine (300, 400, 500, 600, 800 and 1000 mg/L) for 96 hours, and their behavior was monitored using the following parameters: total distance moved, velocity, freezing duration, clockwise rotation and counterclockwise rotation. The results indicate a dose-dependent but also concentration-dependent response, revealing different patterns of toxicity depending on these. Moreover, the treatment appears to increase the time spent at the bottom of the aquarium, which may indicate a possible sign of anxiogenic effect. These data support the need for stricter monitoring of tartrazine use, given the potential impact on the health of exposed organisms.

Keywords: tartrazine, zebrafish, behavior, toxicity

EFFECTS OF ELECTROMAGNETIC FIELDS ON LIVING ORGANISMS

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The main aim of the study was to raise awareness among young students (from high school and post-high school health) and students (Faculty of General Medical Assistance) about the impact of electromagnetic fields on living organisms, including plants, animals and humans. In the context of increasing exposure to these fields, caused by technological advances and the spread of electronic devices, the study aims to deepen knowledge of the physical, chemical and biological phenomena involved and identify health risks.

The methodology was based on the analysis of recent studies and research, both national and international, to highlight the potential effects of exposure and to propose protective measures.

The results indicate that prolonged exposure can have negative consequences on health, but many risks can be prevented by adopting a healthy lifestyle, avoiding excessive exposure and using appropriate protective measures. Reducing the time spent in front of electronic devices such as mobile phones, monitors and Wi-Fi routers can have a positive impact on health, reducing exposure to electromagnetic radiation and, implicitly, the risk of developing certain types of cancer. It is recommended to implement regular periods of rest and disconnection to avoid overexposure. Limiting exposure to polluted environments, such as contaminated air, water and soil, is also essential to protect the health of the population. Active participation in information and education actions on risk factors and the adoption of a healthy lifestyle are important steps in prevention. In conclusion, the combination of these simple but effective measures can have a significant impact in reducing the incidence of cancer and in promoting a healthy life for the entire community. *The conclusion* highlights the importance of education and individual responsibility in managing the risks associated with electromagnetic fields, as well as the need for correct information to maintain health, especially in the context of modern technology.

Keywords: radiation, electro-magnetism, plant, animal, human organism

THE IMPACT OF SOMATO-VEGETATIVE HEALTH ON THE PSYCHO-EMOTIONAL STATE OF HOSPITALIZED PEOPLE

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The worsening of somato-vegetative health and hospitalization of people also influence their emotional state. The worsening of somato-vegetative health and hospitalization of people also influence their emotional state. At the same time, the analysis of the specialized literature indicates insufficient studies, even very few, that examine and identify the consequences of hospitalization on the psycho-emotional state and well-being of patients. What's more, no research review has summarized this evidence so far. It is also necessary to mention that a person's recovery depends to a large extent on his or her own will and emotional state. The aim of the investigations was to assess the effects of hospitalization on the emotional state and mental well-being of patients admitted to the emergency unit.

The investigations included 107 persons (62 women and 45 men) aged 27 to 90 years hospitalized in the emergency care unit with various somato-vegetative diseases. The following indices were tested: general condition; emotional state; spiritual state; behaviour; mental state; cognitive state; sleep; work capacity; heart rate; appetite.

Thus, upon admission to the emergency care unit, about 90% of hospitalized subjects showed negative emotions, including: 50,5 % – irritability, aggressiveness or depression; 90 % – emotional apathy; in 78 % the spiritual state worsened; in 32 % the behaviour became more complicated, more aggressive; in 89% the mental state became tense; in 85% thinking and attention worsened; insomnia appeared in 91%, work capacity worsened in 91% and fatigue appeared; flexibility in the frequency of heart contractions appeared in 66%; appetite decreased in 42% and increased in 59%. All these symptoms, which reflect the tense psycho-emotional state of hospitalized people, are due to the awareness of the aggravated health situation and the development of psychogenic stress.

Therefore, in the case of therapy of various somato-vegetative diseases in association with their treatment, it is strictly necessary to establish the patient's psycho-emotional status and include its treatment or correction. This would contribute to the treatment of somato-vegetative diseases and would greatly facilitate the recovery of the sick.

Keywords: *somato-vegetative health, heart contractions, blood pressure, psychoemotional state, emotions, cognitive state, sleep.*

The Conference was attended by 430 participants from 21 universities, 48 institutes and research centers, 7 other organisations representing 10 countries, including: Republic of Moldova (266), Ukraine (55), Romania (63), Serbia (23), Russian Federation (14), Germany (5), Slovak Republic (1), Canada (1), Sudan (1), France (1).

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