ABSTRACT&REFERENCES

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HYGIENIC ASSESSMENT OF TAP WATER QUALITY BY SANITARY-CHEMICAL PARAMETERS AND IMPROVEMENT OF THE SCIENTIFIC METHODOLOGICAL APPROACHES OF THEIR ASSESSMENT IN ACCORDANCE WITH THE REQUIREMENTS OF THE EUROPEAN LEGISLATION

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Aim. *The aim of the study was to carry out a hygienic assessment of the quality of tap water produced from the Dnipro River water in relation to the content of sanitary-chemical indicators and to improve the scientific and methodological approaches to their evaluation, according to the relevant indicators, taking into account the requirements of European legislation.*

Materials and methods. *The materials of the Communal Enterprise «Dniprovodokanal»,Communal Enterprise «Vodokanal» (Zaporizhzhya), Communal Enterprise «Berdyanskvodokanal», the Communal Enterprise «Oblvodokanal» regarding the technologies of water purification, the quality of the outgoing and plumbing drinking water for 2015–2017 were analyzed. The requirements of the normative documents – DSanPin 2.2.4-171-10 «Hygienic requirements for drinking water intended for human consumption» and Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption. While conducting the research were used following methods: hygienic monitoring, expert evaluation and mathematical statistics.*

Results. *It was found out that at the investigated water supply stations that clean the river Dnipro water, technologies of water treatment had a different type of facilities for coagulation and clarification, presence or absence of preamonization, flocculation, coagulation, type of chlorinated reagent (liquid chlorine or sodium hypochlorite), trademark of aluminum hydroxychloride. The exceedances of nine indicator sanitary-chemical parameters: turbidity, color, taste, permanganate demand, ammonium, hydrogen indicator, aluminum, iron, manganese – were found in potable tap water. It was discovered that the most problematic parameter is the permanganate demand (PD), the number of samples of potable water which didn't meet the standard for the content of this parameter in potable water of UC «Dniprovodokanal» and UC «Vodokanal» — 100 %, UC «Berdyanskvodokanal» – 19,4 %. Maximum exceedance of standard for the PD (5mg/l) in comparison with other parameters was the highest (by two times). Other parameters were determined in different samples of potable water periodically in concentrations which didn't exceed the temporarily established hygienic standards, or episodically and slightly exceeded the standard. It was determined that treatment technologies for potable water, which were used on UC «Dniprovodokanal» (KPFS, DPFS), are more efficient for the increase of PD than technologies on UC «Vodokanal» (almost two times) and less efficient than technology, which allows for consistent potable water treatment on the stations of UC «Oblvodokanal» and UC «Berdyanskvodokanal» (by 1,2 and 1,3 times respectively). The quality of source water at the waterworks stations as to the content of water samples met the 2nd and 3d class of quality according to the DSTU 4808:2007. The results of researches on the quality of drinking water of 6 water supply stations also indicate the presence of 7 problem indicators (chloroform, dibromochloromethane, chlorine, nickel, selenium, phenols and petroleum products), the excess content of 4 of them testifies to anthropogenic pollution of water p. Dnepr. It was determined that according to the requirements of European legislation it is possible to decide to increase of standard of PD for water from Dnipro River, but only for determined and scientifically substantiated conditions in each particular case. For the crisis resolution in the sphere of potable water supply according to the requirements of European legislation DSanPin 2.2.4-171-10, the following should be added: the concept of "indicator" parameters, new parameter (electrical conductivity), and also indicative maximum permitted standards, which will meet the current regulations to 01.01.2020 in accordance with DSanPin 2.2.4-171-10. Today a new version of DSanPin 2.2.4-171-10 was developed, where the above-mentioned is described.*

Conclusions.

It was proved, that for cleaning surface waters at water supplying stations there are used stale traditional technologies, so potable waters may continuously contain chloroform (in concentrations 1,8 MPC – 4,7 MPC), periodically dibromchlormethane (to 3 MPC) and bound chlorine (to 1,1 MPC).

It was determined, that nowadays potable water quality, which is produced from the water of Dnipro river, doesn't meet the requirements according to 9 indicator parameters: turbidity, color, taste, and flavor, PD, ammonium, hydrogen ion exponent, iron, aluminum, manganese. When comparing with the other parameters, PD has the biggest maximum excess of the standard (5mg/l) (twice), the quantity of the non-standard samples for this parameter can be up to 100 %. On the background of excess content of organic substances in the water of studied potable water intakes of r. Dnipro, there was found the anthropogenic pollution by such substances as: nickel, selenium, phenol and oil products. These substances are constantly or periodically revealed in water pipe drinking waters, including in concentrations, exceeding MPC.

It was determined that according to the legislation requirements in acting DsanPiN 2.2.4-171-10 there is a need of making changes for the determination of indicator parameters. The principles and assessment criteria, which are needed to be taken into account by competent bodies if necessary to correct normative by indicator parameters, were determined

Keywords: *indicator parameters, potable tap water, permanganate demand, waterworks stations*

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THE EVALUATION OF THE FUNCTIONAL SYSTEM OF «BRAIN-HEART» DURING THE PROCESSING OF INFORMATION IN STUDENTS BY THE METHOD OF DIFFERENTIAL SCALES

p. 12-19

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The aim of the research *is to develop differential scales for assessing the functioning of the brain-heart system of student youth, which are based on individual neurodynamic and neurovegetative characteristics of information processing.*

Methods *A comprehensive research was performed on the EEG activity of the brain, the spectral characteristics of the regulation of cardiac rhythm (CR), electrical resistance of the skin (ERS), the assessment of the success of the studying (SS) and the level of anxiety in students with different individual neurodynamic properties of higher nervous activity (HNA) in a resting state and during the processing of information on a computer.*

Results of the research *In the resting state the interdependencies between the studied indicators were not established. During the task of processing and differentiating of information, a connection was established between the individual neurodynamic properties of HNA, the EEG activity of the brain, the power of the spectrum of autonomic regulation of HR, ERS, SS and reactive anxiety (RA).*

Conclusions *On the basis of the application of scaling technology to the quantitative and qualitative characteristics of neurodynamic and neurovegetative properties of psychophysiological functions, five levels of functioning of the "brain-heart" system have been identified and recommendations have been developed for the corresponding studying regimes. We believe that the use of differential scales opens up new possibilities of individualization of education, typology of the evaluation of the functioning of the "brain-heart" system during mental activity, and also broadens the prognostic criteria for its resistance to stress-induced studying factors in students*

Keywords: *differential scales, processing of information, evaluation of individual and typological characteristics, success of studying, reactive anxiety*

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ASSESSMENT OF CHANGES IN THE INTESTINAL MICROBIOME IN THE LATE DEBUT OF ULCERATIVE COLITIS

p. 19-24

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*The **aim** of the study was to reveal the peculiarities of the intestinal microflora in patients with early and late debut of ulcerative colitis. **Methods of research:** theoretical – analysis of scientific-methodical and special literature; experimental methods – collection of samples and DNA isolation, determination of oligonucleotide primers, polymerase chain reaction (PCR), determination of microbiom composition; mathematical – the method of average values.*

***Results**: In the course of the study, it was determined that the number of Bacteroidetes in patients with late onset of UC development decreased in the Ukrainian population, and the level of Actinobacteria increased. Changes in the microbiota in patients with UC with different localization of the inflammatory process were analyzed. It is established that the composition of microbial types significantly differs not only depending on the age of onset of the disease, but also on the localization of the inflammatory process in the intestine. As the prevalence of UC increased, the level of Actinobacteria was highest in patients with left-sided bowel disease and late onset of UC. Whereas in patients with total intestinal lesion, both early and late development of the UC revealed a maximum decrease in Faecalibacterium prausnitzii.*

***Conclusion**: UC patients experience intestinal dysbiosis. The level of Actinobacteria is increased in patients with late onset of UC development, and the number of Bacteroidetes decreases. In patients with early and late onset of the disease, multidirectional changes in the intestinal microbiome were detected, the number of Akkermansia muciniphila increased and Faecalibacterium prausnitzii decreased, which could lead to the development and progression of the disease. The ratio of Firmicutes / Bacteroidetes may be an additional marker for assessing the severity of intestinal dysbiosis in UC patients. At the same time, the prevalence of the pathological process in the intestine largely determines the therapeutic tactics and prognosis of patients with UC*

***Keywords:** ulcerative colitis, Firmicutes, Bacteroidetes, Actinobacteria, Faecalibacterium prausnitzii, Akkermansia muciniphila*

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PHYTOINDICATORS OF ECOSYSTEM DYNAMICS IN RING-BANK UKRAINIAN POLISSIA

p. 25-30

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The publication discusses the study results of energy dynamics in ecosystems. The goal of the study is to search for objective parameters to determine the indicator of the ecosystem dynamics and basing on the above-ground phytomass quantitative indices, its age and changes of floristic composition we demonstrate the possibility of the accurate phytoindication assessment of ecosystems dynamics. It is determined that the indicators of above-ground phytomass naturally increase during self-development of natural ecosystems (autogenic succession).

***Materials and methods.** The above-ground phytomass is measured in ecosystems that are at different stages of autogenic succession. In order to balance the fluctuation of the indicators, that was caused by the domination of species with different types of photosynthesis, the correction for the age of the above-ground phytomass was used.*

***Results.** The dynamics indicator increases during the autogenic succession. External influences deflect it from the main trend. The anthropogenic influence often displaces succession in the opposite direction. The method was tested on the territory of Right-Bank Ukrainian Polissia. Expansion of the database of results of dynamic indicator determination allows to calculate this indicator with accuracy sufficient for practical and theoretical purposes.*

Such methods allow studying ecosystem thermodynamics (entropy and energy stocks) and ecosystem dynamics in noninvasive and non-contact way without affecting of plant biodiversity. Such approaches could be the most suitable for conducting studies on natural protected areas. Within such objects, it is not allowed to remove the above-ground phytomass, to determine the energy and dynamic indicators.

***Conclusion**. The unit that will correspond the self-development stage, is an index that is directly proportional to the aboveground phytomass quantity and its age. The ecosystem entropy value will be inversely proportional to the self-development stage index. This index can be determined by classical phytoindication methods upon detailed database availability. Measurement errors, associated with phytoindication method range from 3 % to 10 % comparing to 5–10 % for direct method, are commensurate. The phytoindication approach allows application of this methodology on the protected areas. The index of the ecosystems self-development stage can be used to predict the development of specific studied plots and for the needs of ecosystem classification*

***Keywords:** ecosystem dynamics, phytomass, phytoindication, succession, energy, entropy, dynamic index, self-development*

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INFLUENCE OF FOREST PLANTATIONS OF FINE-LEAVED LINDEN ON MAIN PROPERTIES OF DARK-CHESTNUT SOIL OF AGROBIOSTATION – BOTANICAL GARDEN OF KSU

p. 31-35

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***The aim of this work** – determination of soil-transforming role of fine-leaved linden fall in forest plantations on dark-chestnut soil.*

***Research materials and methods.** Dark-chestnut soil was chosen as an object of our research. For making the comparative analysis, indices of soil properties were determined in forest plantations of fine-leaved linden and in motley – fescue-feather grass steppe in the period from 2014 to 2018 years at the territory of Agrobiostation-botanical garden of KSU, where two experimental plots were founded. Soil samples were taken in a layer in 0–50 cm. Fall and remains of steppe plantations were not excluded since the beginning of experiment in autumn. All laboratory studies were realized according to standard conventional methods.*

Research results. *At realizing the work we established that the humus content in dark-chestnut soil with plantations of middle-aged trees of fine-leaved linden increased by 0,13 %; the steady alkaline medium formed, the granulometric (mechanical) composition changed from the light to the heavy one by the content of physical mud. The humus content in dark-chest-nut soil with motley — fescue-feather grass plantations increased in 1,1 times that is 0,10 %; the light-sour medium formed, the granulometric (mechanical) composition changed from the light to the middle one by the content of physical mud.*

Conclusions. *Under the influence of fine-leaved linden fall dark-chestnut soil essentially improves its natural properties, but at that the environment for plants, adopted for other conditions essentially changes. Steppe plantations form the light-sour medium, so humus and calcium accumulate slowly, and magnesium – intensively. Dark-chestnut soil has a high absorbing capacity and is a kind of natural cleaner of biogeocenose that must be taken into account at forming urban ecosystems. The quality increase of dark-chestnut soil by biological means is recommended to be realized not only be intensifying metabolism in the system "forest-soil", but also by strengthening accumulation processes that is increasing the total absorbing capacity of forest biogeocenose*

Keywords: *dark-chestnut soil, fine-leaved linden, humus content, granulometric composition, pH*

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EFFECTS 4-(1-ADAMANTYL)-PHENOXY-3-(N-BENZYL, N-DIMETHYLAMINO)-2-PROPANOL CHLORIDE ON THE STRAINS OF *PSEUDOMONAS* SPP.

p. 35-41

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Pseudomonas aeruginosa is one of the main pathogens of nosocomial infections. High resistance of P. aeruginosa to modern antimicrobial agents leads to the decrease in the effectiveness of antibiotic chemotherapy and the need to search for new active compounds. Adamantane derivatives with a wide range of biological activity can be considered as a promising class of substances with an antimicrobial effect.

Aim. *In the present study, our purpose was to examine susceptibility and ultrastructural alterations of P. aeruginosa cells under the influence of 4-(1-adamantyl)-phenoxy-3-(N-benzyl, N-dimethylamino)-2-propanol chloride (compound KVM-97).*

Materials and methods. *The antimicrobial activity assay of tested compound against bacteria of genus Pseudomonas was determined by serial dilution test in broth. Bacterial cells were exposed to the 0.5 MIC and 2.0 MIC of the KVM-97 for 1, 3, 6 and 24 h. Ultrastructure of intact and treated P. aeruginosa cells was examined by transmission electron microscopy after contrasting by uranyl acetate and lead citrate.*

Results. *It was shown, that compound KVM-97 inhibited Pseudomonas spp growth at concentration 2.5 μg/ml. Examination of P. aeruginosa ultrastructure using electron microscopy showed that the cell and cytoplasmic membrane were damaged in the presence of KVM-97 (invaginations, ruptures) with followed disorganization of cell contents, lysis and cell death. These changes are dose-dependent, they are registered after 1 hour of exposure with the compound and intensified with the time of incubation.*

Conclusions. *A study carried out with KVM-97 has shown that the compound possesses significant inhibitory activity against tested bacterial strains. The detected ultrastructural alterations of P. aeruginosa suggest the possible mechanism of action of 4-(1-adamantyl)-phenoxy-3-(N-benzyl, N-dimethylamino)-2-propanol chloride due to its influence on the membrane apparat in bacterial cell.*

Keywords: *adamantane derivatives, mode of action, ultrastructure of cell, Pseudomonas aeruginosa, antibacterial action.*

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MORPHOGENESIS OF *DIANTHUS ORIENTALIS ADAMS*

p. 42-49

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The article deals with the results of the introductory study of Dianthus under the cultural conditions. It also covers biological peculiarities of vegetative and reproductive organs in ontogenesis, rhythm of seasonal development, and the possibilities of its utilization are defined.

D. orientalis is a perennial, polycarpic, semi-bush plant. The plant is characterized by a large distribution on the territory of Georgia. Several new locations are marked.

In the first year after planting, the plant passes all the phases of the virginal period, beginning from its emergence until its mature vegetative state and it is represented by closely linked 14–21 to 28–42 vegetative abbreviated shoots.

Intensive growth and formation of the reproductive organs of the plant begin on the second year of its development. The reproductive sprouts are monocyclic, characterized by branching that produce flowers and bear fruit. At the end of the vegetation, the plant is represented by a basal part of 10-13 cm diameter, with a number of renewal buds, and vegetative abbreviated shoots.

As the plant grows older the morphometric indices of the above ground and the underground parts of the plant grow as well. The number of reproductive sprays on all levels of a five-year old plant and consequently the number of flowers is 2400–4000. The root system consists of main and additional roots; the main root, except for its basal, does not differ from the secondary roots.

In the process of vegetation there are two periods of development – spring (March, April, May, June) and after the maturation of the seed, slightly expressed generation and summer- autumn (August, September, October).

In comparison with the wild growing plants, those growing under the cultural conditions showed better quantity and growth quality, increase of morphometric characteristics and the number of reproductive and abbreviated vegetative shoots, improved external appearance and compactness of bushes. Development of the plant passes noticeably faster and accordingly the duration of the separate stages and phases is shorter. The difference is due to the cultural conditions under which the plant grows and develops. Decrease of all indices and a partial loss of the basal parts of the plant can be considered as a transitory stage into senile period that is marked 10–12 years after the emergence of the plant.

Development rhythm of D.orientalis, its annual abundant flowering and fruit bearing, in some cases the ability of self reproduction, increase of quantitative and qualitative indices of the vegetative and reproductive organs without any special care verify that the plant has a high chance of being introduced under cultural conditions. So it is certain that this original, decorative and easily-maintenance plant can be used in different types of floral arrangements like mixborders, borders, rocky sites, and alpine gardens together with different kinds of ground cover plants and other Dianthus species.

Keywords: *Introduction, Morphogenesis, Development of ontogenesis, Reduced involuntary shoots, Growth rhythm, Decorativeness.*

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LIVER FATTY ACIDS COMPOSITION IN THE STERLET OF DIFFERENT AGES

p. 50-57

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Lipids are important factors in the response of organisms to exogenous action due to their role in energy metabolism and cellular signaling as a structural compound of biomembranes. To date, the features of the fatty acid composition of lipids, in particular in their various fractions, in the tissues of sterlet of different age have been studied to a lesser extent. This determines the topicality of deepening such research, which will be of great practical importance in the future, since it will be aimed at increasing adaptation potential and survival of sturgeon fish, especially given their high cost. Here we present changes of fatty acid composition in different lipid fractions of the liver of sterlet of different age (namely two-, three- and nine-year-old) with masses 0.3–0.4, 0.5–0.6 and 5–6 kg for the age-groups of fish, respectively. Fatty acid (FA) composition was determined using gas chromatography on CarloErba (Italy) in Palladin Institute of Biochemistry of the National Academy of Sciences of Ukraine (NASU). The fatty acid composition of lipids of sterlet liver tissues is represented by saturated and unsaturated high-molecular carboxylic acids, the largest content of which belongs to palmitic, stearic, and oleic, linoleic acids, respectively.

With increasing sterlet age, fractions of triacylglycerols (TAG) of the liver tissues were found, mainly, reducing unsaturated fatty acids. Depending on the increase in the unsaturation of high molecular weight carboxylic acids, a signifi-cant decrease in the amount of their monoenic (1.7 times), dienic (1.8 times) and, especially, polyenic (4 times) was observed. The amount of TAG unsaturated FA in the liver of 9-year-old sterlet was significantly lowered (~2 times) compared to 2- and 3-year-old indi-viduals. Hence, the ratio of saturated and unsaturated FA was great-er (~2 times) in the 9-year-old sterlet compared with the values of this indicator for two- and three-year-old fish.

In the phospholipids of sterlet liver tissues, with an increase of age, a slight increase in the saturated FA content and a decrease in the level of monounsaturated and polyunsaturated fatty acids were recorded. Among the free fatty acids in the liver of sterlet, we identified 27 acids, of them 44 %, 41 %, and 35 % were saturated in 2-, 3-year-old and mature fish, respectively. As for free fatty acids, we can conclude the age-dependent decreasing of saturated fatty acids. Monounsaturated FA content was 27 %, 31 % and 47 % in 2-, 3-year-old and adult sterlet fish, and polyunsaturated FA content –27 %, 25 % and 15 %, respectively.

All this can be used for the theoretical justification and development of appropriate corrective feed additives and premixes.

Keywords: *saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, lipids, liver, sterlet.*

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THE RESEARCH OF LITTER IN POULTRY HOUSE AND USE OF ESSENTIAL OILS IN BROILER PRODUCTION

p. 57-61

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The analysis of literary sources concerning the relevance of studying and laboratory research of litter materials in modern poultry farming is carried out. It was found that litter is not only an accumulation of pollutants, a nutrient medium for the existence of pathogenic and conditionally pathogenic microorganisms, but can carry increasing emissions of harmful gases such as ammonia, carbon dioxide and hydrogen sulfide in the event of a breach of the technology of poultry breeding, thus, causing a negative impact on both the poultry and the personnel of the poultry enterprises. The research confirms the effectiveness of the use of emulsions of essential oils against pathogenic and conditionally pathogenic microorganisms present in litter materials of broiler production. This method in the future will allow to abandon harmful for the environment chemical means of processing of poultry waste.

Aim*. Carry out chemical and microbiological analysis of litter, investigate the bactericidal properties of essential oils.*

Materials and methods. *The research was carried out at the enterprises of broiler production in the Kiev region. The chemical composition and microbiological studies of litter were conducted at the «Ukrainian laboratory of quality and safety of agricultural products» and the microbiological laboratory of the Department of Ecology Ltd. "Complex Agromars" according to DSTU ISO 11885:2005 and DSTU 30726-2002. For study of bactericidal properties of essential oils according to DSTU 50474-93.*

Results of research. *At the initial stage of growing the poultry with the help of laboratory studies it was discovered that in the samples of litter humidity was 22,1 % and the amount of dry matter – 77,9 %. At the final stage of growing the poultry as a result of microbiological research only one sample is the presence of lactose-positive intestinal sticks in 1 g litter less than 3, which indicates its proper sanitary condition. In all samples of the studied litter there is no pathogenic microorganism of the genus Salmonella. It was investigated the bactericidal effect of 9 emulsions of essential oils in concentration of 0,5 and 1 % against microorganisms of E. coli and P. vulgaris.*

Conclusions. *As a result of the chemical analysis of the litter, there was shown the presence of not only chemical elements, impurities (wood sawdust and quicklime), but also the presence of organic matter in the form of crude fat, crude fiber, unsaturated extractives and amino acids with different percentages.*

It has been shown that in samples of litter of broiler production, there is no pathogenic microorganism of the genus Salmonella, this testifies to the high quality of products and the satisfactory epidemiological and sanitary state of the investigated poultry enterprise. Ther was detected the bactericidal effect of 7 of the 9 emulsions of

essential oils studied as antibacterial preparations of a wide spectrum of action with a concentration of solution of 0.5 and 1 %
Keywords: *litter, broiler production, pathogenic and conditionally pathogenic microorganisms, essential oils*

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