

## ABSTRACT&amp;REFERENCES

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## ANTIBIOFILM ACTIVITY OF AZITHROMYCIN AGAINST STAPHYLOCOCCUS EPIDERMIDIS

p. 4-9

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*The aim of the study was to establish specific activity of azithromycin against the biofilm, formed by S. epidermidis and several aspects of the mechanism of the effect of this preparation.*

*The ability of Staphylococcus to adhesion on abiotic surfaces (polystyrene plane-tables) was determined by Christensen methodology (fixation by 96 % ethanol, coloration by 0.1 % solution of gentian violet). The antibiofilm activity of azithromycin was investigated by the method of sorption of gentian violet on biofilm structures with further desorption in 96 % ethyl alcohol. The hydrophobic behavior of a strain was investigated using BATH-test in the two-phased system with ethylacetate. For determining the ability of epidermal Staphylococcus to producing polysaccharide intercellular adhesin (PIA) there was used Luria-Bertani (LB) agarized medium with 0,08 % red Kongo. The study of the antibiofilm activity of azithromycin demonstrated that the antibiotic disturbs fixation to the abiotic surface and film formation of S. epidermidis 2265 in concentration 5.0 MIC, but doesn't have the inhibiting effect of the formed 1-day film. It was established, that a clinical strain of epidermal Staphylococcus S. epidermidis 2265 has no ability to production of polysaccharide intercellular adhesion (PIA). The studies demonstrated that the effect of azithromycin is directed on the primary stages of biofilm formation. It was established, that the mechanism of the effect of the antibiotic on biofilm bacteria is not conditioned by a change of the hydrophobic behavior of the bacterial surface and PIA production*

**Keywords:** biofilms, Staphylococcus, antibiotics, mechanisms of effect, adhesion, hydrophobic behavior, red Kongo, PIA

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## RESULTS OF MONITORING THE QUALITY OF DRINKING WATER IN BOTTLES AND FROM POINTS OF BOTTLING FOR SANITARY-CHEMICAL INDICATORS

p. 9-15

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*It was determined that 57 % of samples of potable water from points of bottling and bottled water after the direct installation of equipment or after their long production didn't meet the hygienic*

requirements. Every second sample of potable water after additional treatment of tap potable water, especially for surface sources of potable water supply, didn't meet the hygienic requirements for the trihalomethanes (THMs) content. The most common method of reverse osmosis couldn't remove from the water more than 40–60 % of THMs, what is not always taken into consideration by manufacturers in installation of modern systems for tertiary treatment of potable water with multiple modules. Among the 33 different samples of tertiary treated tap water and 38 samples of groundwater, which quality didn't meet the hygienic requirements, nearly 33 % and 24 % respectively (significantly more in fact) had dry residue less than 100 mg/l. Depending on the frequency of not meeting the hygienic requirements, indicators of potable water quality can be placed in the following row: chloroform and other THMs > dry residue > permanganate demand > color > ammonium and nitrates > phenols > hydrogen ion exponent, silicon, sodium, chlorides, iodine (for the potable waters produced from the tap water); silicon > dry residue > color > nitrates > alkalinity, manganese, hydrogen ion exponent, total hardness, turbidity > total iron > fluorine, permanganate demand, nitrates (for the potable waters produced from the groundwater). The reason of inappropriate potable water quality is the lack of professional selection of water treatment equipment, particularly the violation of applicable legal requirements regarding conducting the laboratory research of source water, selection of a rational scheme and technology of water treatment

**Keywords:** bottled potable water, point of bottling, tertiary treatment of potable water

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#### POTENTIOMETRIC DETERMINATION OF INTEGRAL ANTIOXIDANT ACTIVITY OF INFLORESCENCES OF *MATRICARIA RECUTITA* PLANTS CULTIVATED UNDER DIFFERENT CONDITIONS WITH APPLYING GROWTH BIOSTIMULANTS

p. 16-19

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The article presents the results of the research on the effect of growth biostimulants «Vermybiomah», «Vermyiodis» and «Vermystym» on the antioxidant activity of inflorescences of aqueous and alcohol extracts of *Matricaria recutita* L. plants of the cultivated variety «Perlyna Lisostepu» grown on the sod-podzolic soil of the Precarpathian zone and dark gray podzol medium loamy soil of the Western Forest-Steppe. The material for the study was inflorescences of *M. recutita* plants, collected from different experimental sites and dried to air-dry state. Aqueous and alcohol extracts of *M. recutita* inflorescences were prepared in accordance with the requirements of State Pharmacopoeia of Ukraine. Determination of antioxidant activity was performed in our studies by potentiometric method (0.01 M  $K_2[F(CN)_6]$  and 0.0001 M  $K_4[Fe(CN)_6]$  in 0,066 M phosphate buffer with pH 7,2), on the basis of Brainina's methods and co-workers and Aronbaiev and his co-work. It has been established that inflorescences of water and alcohol extracts of *M. recutita* plants exhibit antioxidant activity. Alcohol extracts of inflorescences of *M. recutita* plants are characterized by the antioxidant activity of 1.3–1.5 times higher, compared with the aqueous ones. It has been found that extracts of inflorescences of *M. recutita* plants cultivated in the conditions of Precarpathian zone with applying growth biostimulants are characterized by higher integral antioxidant activity, compared with plants of the control variant (14,36 - in aqueous and 20,52 mg AK/g of abs. dry mass – in alcohol extracts). The highest antioxidant activity was observed in plants grown under the influence of «Vermybiomah» (25.4 % in aqueous and 26.7 % in alcohol extracts compared to control). It has been shown that inflorescences of *M. recutita* plants cultivated in the conditions of the Western Forest-steppe are characterized by the integral antioxidant activity of authentically 16 % higher ( $p \leq 0.05$ ) than plants grown in the Precarpathian zone

**Keywords:** *Matricaria recutita* L., growth biostimulants, a potentiometric method, an integral antioxidant activity, an oxidation-reducing potential

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## ENVIRONMENTAL ASSESSMENT OF GROUPING COLEOPTERA IN BROILER POULTRY FARM

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*Sampling of litter samples was carried out on broiler and parental poultry farms with different age stages of cultivation. The ecological features of formation of populations of synanthropic species of beetles are investigated. The influence of insecticides on the kind of darkling beetle is shown as one of the methods of preventing the spread of their population.*

*In the course of research it is shown that the microclimate of the poultry house and high temperatures are optimal for the development of harmful entomological fauna. The distribution of beetle populations depends on the term of growing poultry and mechanical damage to the litter.*

*It has been shown that insecticides are an optimal option to fight pests in poultry enterprises even in small doses. But due to their prolonged use, insects have developed resistance to drugs so they need to be changed with a certain periodicity which can be economically disadvantageous for the poultry industry and make significant financial expenses.*



The article outlines the probable ways of pests in broiler and parental poultry farms and the negative effects of their spread. Such species of beetles as were identified – *Alphitobius diaperinus*, *Trogoderma variabile* and *Sitophilus granarius*.

The insecticidal effect of pyrethroid drugs on the species *A. diaperinus* is shown, optimal harmful concentrations are calculated

**Keywords:** synanthropic species, grouping, cosmopolite, poultry farming, insecticides, pyrethroids, active substance

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**ONTOGENETIC POPULATION ANALYSIS OF RARE SPECIES *LILIUM MARTAGON* L. IN THE STRUCTURE OF ECOLOGICAL NETWORK OF VINNYTSIA REGION**

p. 25-29

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According to the results of the research on phytomagnification of the connecting territories of the ecological network of Vinnytsia region, the distribution of rare and endangered species of higher vascular plants, which characterize the value of these territories, is determined. An ontogenetic-populational analysis of the state of cenopopulations was carried out on an example of the rare species *Lilium martagon* L. This species is a model for the studied phytocoenoses of the connecting territories of ecocorridors of the national (South-Bug, Dnestrovsky), regional (Lyadovsky, Nemiisky) levels. The ontogenetic spectra of investigated *L. martagon* L. populations were constructed and analyzed for their belonging to one of four types: left-sided, centered, right-handed, bimodal. It is determined that they belong to incomplete ones, with the prevalence of the right-hand spectrum. The integral estimation of the population condition is carried out using the ontogenetic indices of I. M. Kovalenko (indices of regeneration, aging, generative and age). The index of age-old AA Uranov –  $\Delta$ , index of efficiency of L. V. Zhivotovskiy –  $\omega$  is calculated. The affiliation of each of the studied populations to a certain type of ontogenetic structure of populations according to the classifications by TA O. Rabotnova (invasive, normal, regressive) and LV Zhivotovskiy (young, transitional, dying, mature, aging, old) are determined. According to the results of the conducted research, it has been established that *L. martagon* L. populations are characterized as normal with subsequent transformation into regression. On the basis of the obtained results, conclusions are made on the ontogenetic structure of model populations of the rare species *L. martagon* L.

**Keywords:** population, *Lilium martagon* L., ontogenetic structure, rare species, ecological network, connecting territories

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#### SPECTRAL CHARACTERISTICS OF CARDIAC RHYTHM IN A RESTING STATE IN CONDITIONS OF PASSIVE ANTYORTHOSTASIS IN PEOPLE WITH HIGH AND LOW FUNCTIONAL MOBILITY OF NERVOUS PROCESSES

p. 30-34

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**Aim of research.** Spectral characteristics of cardiac rhythm (CR) in a resting state and in conditions of antyorthostasis in people with high and low functional mobility of nervous processes (FMNP)

**Methods.** The method of registration of CR in a resting state (lying position) and in conditions of passive antyorthostasis (head-down-tilt) in people with high and low FMNP was applied with the help of computer complex “Cardiolab+”.

**Results of research.** Spectral characteristics of CR in lying position and in conditions of head-down-tilt in people with high and low

FMNP were investigated. Spectral characteristics of CR of persons with different FMNP during lying position had no significant differences. In head-down-tilt conditions differences in characteristics of CR regulatory processes of persons with different FMNP were revealed. Correlation between FMNP and indexes of CR functioning recorded in head-down-tilt conditions were established. This was shown by a bigger participation of high extracardiac centers in regulation of CR in persons with high FMNP.

It confirms the participation of the FMNP in the development of adaptive rearrangements.

**Conclusions.** In lying position there were not founded differences between indexes of CR in people with different FMNP and was installed the prevalence of intracardiac adaptive mechanisms. It was established that the level of functioning of the CR in the conditions of head-down-tilt was associated with the individual expressiveness of the FMNP. Correlation analysis found out the participation of the individual properties of FMNP in the activation of autonomic mechanisms of CR regulation during the processing of adaptive reactions to antyorthostasis. In persons with high gradation of the investigated typological property of the spectral characteristics of CR adaptive reactions were differentiated by higher stress of vagosympathetic, sympathetic and humoral-metabolic extracardiac mechanisms of regulation of the autonomic nervous system. The adaptive reactions of persons with low FMNP occurred at the lower level of the functioning of the CR; differed in sympathetic regulation and had a narrower range of CR

**Keywords:** functional mobility of nervous processes, spectral characteristics of the cardiac rhythm, passive antyorthostasis

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#### IN VITRO EVALUATION OF SALT TOLERANCE OF POPLARS AND WILLOWS

p. 35-38

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*The irrational anthropogenic influence on soils often leads to negative consequences, one of which is salinization. Among various types of salinity, chloride salinity has the greatest negative effect. Accumulation of chlorine ions by plant cells causes disturbances in their*



metabolism, as a result of cell membrane damage. Such changes have a negative effect on the tree growth. Poplar and willow are energy trees with rapid growth and a wide range of adaptations to environmental conditions. These plants are not halophytes, but some genotypes are relatively salt-tolerant. Growing them in saline areas will have not only the ecological effect of soil remediation and importance for the urban horticulture, but can also bring economic profits, particularly in areas excluded from agricultural usage due to their salinity. The aim of the study was to analyze the salt tolerance of aspen (*Populus tremula*), hybrid poplar clone 'INRA 717-184' (*P. tremula* × *P. alba*) and willow clone 'Olympiyskiy vohon' (*Salix alba* × *S. fragilis*) under *in vitro* cultivation on the medium with sodium chloride added in concentrations 25 mM, 50 mM and 100 mM. General plant state, intensity of their growth (by the shoots' length) and root formation (by number of roots) on the 10th, 30th and 60th day of cultivation were estimated. The results demonstrated that salt tolerance significantly varied in different genotypes. In hybrid poplar clone 'INRA 717-184', the intensity of growth activity was decreased after long-term cultivation under all investigated concentrations of sodium chloride. In aspen plants, a significant decrease of the intensity of shoots growth by 94.3 % compared to control was found only after two months of cultivation, then concentration of NaCl in media was 100 mM. The intensity of willow growth was not affected at any experimental treatment by sodium chloride. A statistically significant decrease of the intensity of root formation after the 1-st and 2-nd months of cultivation was shown only for aspen clones planted in the culture medium with 100 mM of sodium chloride added. In general, willow clones demonstrated higher intensity of root formation than poplar clones

**Keywords:** *Populus*, *Salix*, salt tolerance, sodium chloride, *in vitro* culture, growth rates

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#### FEATURES OF SEASONAL DYNAMICS OF BIOGENS CONTENT IN THE SUPERFICIAL WATERS OF VIDSICHNE WATER INTAKE OF TETERIV RIVER

p. 39-44

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**Aim of the research** – to reveal features of the seasonal dynamics of the biogens content in surface waters of Vidsichne water intake of the river Teteriv in 2012–2014 years and explanation of their correlations with the number of plankton water plants.

**Methods.** In water samples, taken from water intake (1 dm<sup>3</sup>), there was determined the content of ammonia, nitrites, nitrates and polyphosphates by photometric methods, for studying the composition of phytoplankton, there was realized the hydrobiological analysis,

statistical processing of the data was realized by the program MO Excel 2003.

**Research results.** The most content of nitrogen oxides in water was observed in spring months as a result of washing nitrogen fertilizers out from soil at overflow, polyphosphates – in winter, when they are not used by phytoplankton. The growth of ammonia concentrations during a year was conditioned by the systematic income of flowing with nitrogen compounds that it was formed of in the water basin. The conducted correlative analysis showed negative weak and middle correlations between the content of separate biogens in water and the number of plankton water plants.

#### Conclusions.

1. The studies determined that biogens concentrations didn't exceed MPC<sub>s</sub> and their seasonal dynamics was typical for nitrites, nitrates, polyphosphates and not typical for ammonia. The content of this substance in water (in average 0,42 mg/dm<sup>3</sup>) is more than the natural one (from 0,01 to 0,20 mg/dm<sup>3</sup>), and features of its fluctuations testified intensification of ammonification processes.

2. It was established, that in 2012–2014 there was observed “flore-scence” of water mainly at the expanse of blue-green water plants (cyanobacteria), which number increased in average in almost 12 times comparing with 2003–2005. At the same time veritable correlations of these water plants with biogens were lost (excluding 2013 year, when the correlation of the nitrates content with the number of blue-green ones was – 0,5780 and green – 0,5458, and also the content of nitrites with the number of blue-green ones was at the level of – 0,5743).

3. There was revealed the intensification of correlations of the ammonia content in water with the number of cells of green (–0,6577 in 2012) and diatomaceous (–0,5332 in 2013) water plant and vice versa – the essential weakening of correlations between the content of polyphosphates and representatives of phytoplankton of all sections, especially there took place the decrease of most values of their correlation coefficients with blue-green (from –0,6662 to –0,3255) and green from –0,6118 to –0,3507) water plants.

4. The ground of these disorders in the water basin was the moderate systematic pollution of water by flowing at the background of climatic changes that was proved by ammonification activation and deceleration of nitrification transformation of nitrogen-containing biogens that is by processes that indicate the absence of the proper detoxication of ammonia in the water environment. For preventing the water intake pollution, it is necessary to prevent unapproved water flowing to it

**Keywords:** biogens, phytoplankton, season fluctuations, anthropological eutrophication, water “flore-scence”, correlation degree

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