

**Резюмета на научните публикации**  
**на гл. ас. д-р Дияна Маринова Дерменджиева**

Представени за участие в конкурс за заемане на академичната длъжност „доцент“ по научна специалност „Екология и опазване на екосистемите“, област на Висше образование

4. Природни науки, математика и информатика, професионално направление  
4.3. Биологически науки

1. **Dermendzhieva D**, Kostadinova G., Petkov G., Dinev T., Beev G., 2021. Agro-ecological Characterization of Vermicomposted Sewage Sludge from Municipal and Poultry Enterprise Wastewater Treatment Plants. *Sains Malaysiana*, 50(8): 2167-2178. ISSN номер: 01266039. **IF – 1.160; SJR – 0.251 (2020), Q2.**

**Abstract** The purpose of this study was to make an agro-ecological characterization of vermicompost (VC) produced from sewage sludge (SS). As a substrate, SS from municipal and poultry meat processing enterprise wastewater treatment plants (MTP and PTP, respectively) was utilized. The substrates were vermicomposted by Red Californian earthworm (*Lumbricus rubellus*) for 120 days. For VC quality assessment, 19 physicochemical and 6 microbiological parameters were used. The evaluation of physicochemical parameters was done according to ISO standard methods and microbiological analysis-by plating 1 mL of sample dilutions on selective, chromogenic culture medium sheets. It was found that the vermicompost from MTP (VC-M) had higher levels of EC, mineral elements (N, P and K compounds in forms available to plants), heavy metals (Mn, Cu, Zn, Cr, Ni, Pb, Cd) and coliforms, and lower levels of pH, TOC, C/N ratio, Fe, total plate count (TPC), Enterobacteriaceae and Salmonella spp. counts compared to VC from PTP (VC-P). During the vermicomposting process, the substrates from both wastewater treatment plants (TPs) showed similar trends towards decrease in pH, TOC, N-NH<sub>4</sub><sup>+</sup>, C/N ratio, TPC, coliforms, *E. coli*, *Enterobacteriaceae* and *Salmonella* spp. counts, whereas the opposite trends were established for EC, TKN, N-NO<sub>3</sub><sup>-</sup>, TP, P<sub>2</sub>O<sub>5</sub>, TK, and K<sub>2</sub>O values. The vermicomposting had a negligible effect on heavy metal concentrations. In the final substrates *E. coli* were not detected, while the bacterial spore forms (*Clostridium perfringens*) were not eliminated. The final substrates cannot be used as fertilizers or soil amendments because of the presence of *Salmonella* spp. and *C. perfringens* over the permissible limits according to EU and Bulgarian regulations.

2. Dinev, T., Tzanova, M., Velichkova, K., **Dermendzhieva, D.**, Beev, G., 2021. Antifungal and antioxidant potential of methanolic extracts from *Acorus calamus* L., *Chlorella vulgaris* Beijerinck, *Lemna minuta* Kunth and *Scenedesmus dimorphus* (Turpin) Kützing. *Applied Sciences* (Switzerland), 11(11), 4745. ISSN номер: 20763417. **IF – 3.021; SJR – 0.435 (2020), Q2.**

**Abstract.** Plant extracts are an important alternative to antibiotics, which are ever more restricted because of their developing microbial resistance and some adverse effects that have been observed following frequent application. The aim of the present study was to determine the antifungal and antioxidant activity of the methanolic extracts of *Acorus calamus*, *Chlorella vulgaris*, *Lemna minuta* and *Scenedesmus dimorphus*. The antifungal activity of the extracts against strains of *Aspergillus flavus*, *Aspergillus parasiticus*, *Aspergillus ochraceus*, *Aspergillus niger*, *Aspergillus carbonarius*, *Fusarium graminearum*, *Fusarium oxysporum*, *Penicillium chrysogenum* and *Alternaria alternata* was evaluated via the agar well diffusion method. The antioxidant activity of the extracts was measured through the determination of three parameters—total phenolic content, total flavonoid content and radical scavenging potential (determined through UV/Vis analysis). *A. calamus* extracts had the highest antimicrobial activity against eight fungal strains, followed by the *C. vulgaris*, *L. minuta* and *S. dimorphus* extracts, which were inhibitory against two to three strains. Among the extracts from the species studied, the extract from *S. dimorphus* showed the highest antioxidant potential, as determined via the DPPH (1,1'-diphenyl-2-picrylhydrazil-radical) method. This correlated to its high total phenolic and flavonoid content. From *A. calamus* and *L. minuta*, methanolic extracts were obtained that exhibited similar values of the aforementioned parameters, followed by *C. vulgaris* extracts, which showed the lowest antioxidant activity. Based on the Pearson correlation coefficients, the impacts of the total phenolic content and the total flavonoid content on radical scavenging capacity are similar, and flavonoids were a significant part of the total phenolic compounds extracted from the plant materials studied.

3. Dospatliev, L., M. Ivanova, A. Daskalovaa, **D. Dermendzhieva**, D. Dimitrov & M. Stoyanova, 2021. Seasonal changes in quality and fatty acid composition of *Trachurus mediterraneus*, *Oxidation Communications*, 44(1):72–80; ISSN номер: 02094541. **SJR - 0.224 (2019), Q3.**

**Abstract.** The study was designed to assess the seasonal variations in the quality and lipid profile of meat *Trachurus mediterraneus* harvested in the Bulgarian coast of Black Sea. The trial period lasted from May to October and the sampling was carried out in the area of Varna Bay. Lipid extraction was done according to the Bligh and Dyer method. The fatty acid composition was determined by GC/MS. The levels of saturated (SFA), monounsaturated (MUFA), and polyunsaturated fatty acids (PUFA) varied between 39.88–43.16; 27.87–31.25; and 28.87–28.97%, respectively, in total fatty acid methyl esters (FAME). Regarding to the lipid contents, AI, TI and h/H levels,  $(n - 6)/(n - 3)$  and P/S ratios we can conclude that this Black Sea fish species can be considered a source of high quality fatty acids and have good nutritional quality.

4. **Dermendzhieva D.**, G. Zhelyazkov, G. Beev, G. Kostadinova, T. Dinev, G. Petkov, 2019. Eco-Agricultural Assessment of Ovcharitsa Dam (Bulgaria) Water Used For Cooling of Thermal Power Plant. *Ecologia Balkanica*, 11(2):167 – 180. ISSN номер: 13140213. **SJR – 0.123 (2018), Q4.**

**Abstract.** Ecological (as a natural source) and agricultural (as a resource for fish farming and irrigation of crops) assessment of Ovcharitsa Dam water, used for thermal power plant (TPP) cooling was carried out in one monitoring point by measurement of 12 physicochemical parameters (temperature, transparency, pH, EC, DO, COD, BOD<sub>5</sub>, unionized NH<sub>3</sub>, NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, total N and P-PO<sub>4</sub>), one biological parameter (chlorophyll-a), 9 pesticides and volatile organic compounds /VOC/ (atrazine, simazine, diuron, 1,2,3-, 1,2,4- and 1,3,5-trichlorobenzene, tetrachloroethane, trichloromethane, hexachlorobutadiene) and 6 microbiological parameters (aerobic mesophilic microorganisms, coliforms, total coli titer, *Escherichia coli* counts, *E. coli* titer, *Salmonella* spp. counts), stipulated in Bulgarian legislation in 2016-2017 (REGULATIONS: No. 4, 2000; No. 18, 2009; On EQS for priority substances and certain other pollutants, 2010 and No. H-4, 2012). The water samples were taken periodically during a two-year period: for physicochemical and biological analysis – in February, April, June, August and November; for microbiological observation – in June, August and November; for pesticides and VOC – in April. Water sampling, sample preparation and analysis were performed according international ISO and BSS standards. It was found that: a) the dam water ecological status was determined as “poor” by chlorophyll-a content and “very poor” by orthophosphates content based on the lowest estimates for the monitored parameters; b) with regard to the content of pesticides and VOC, the dam water was defined as water “in good chemical status”; c) the values of all monitored parameters were within the ranges (recommended and mandatory) for carp fish water with exception of temperature and unionized NH<sub>3</sub>, which exceeded the norms during some months of the year; d) according to measured water transparency, the trophic state of dam water was determined as hypereutrophic; e) the microbial status of the analyzed water demonstrated that it was not suitable for irrigation because it exceeded norms for total coli-titer and *E. coli*-titer, and due to the presence of intestinal pathogens (*Salmonella* spp.), which are not allowed in the water for irrigation.

5. Klisarova D, D. Gerzhikov, G. Kostadinova, **D. Dermendzhieva**, 2019. Phytoplankton quantitative development and species diversity in the Bulgarian Black Sea waters during 2014-2017. *Bulgarian Journal of Agricultural Science*, 24 (Supplement 1), 141- 147. ISSN номер: 13100351. **SJR – 0.261 (2018), Q3.**

**Abstract.** The aim of this study is to analyse the characteristics in the development of the phytoplankton communities in the Bulgarian part of Black Sea and in Varna Lake in present days, to trace the occurring changes and to assess their ecological status. During the study period (2014-2017), 196 phytoplankton samples were collected from 52 stations by bathometer type Niskin 5L. The samples were prepared for analysis (fixed and concentrated) and analyzed by routine methods. The analysis of the qualitative and quantitative structure of phytoplankton in the monitored areas revealed the existence of 182 phytoplankton species belonging to 14 taxonomic classes. The share of *Dinophyceae/Bacillariophyceae* group in the phytoplankton composition was 72.53%. A total of 8 species in the coastal and shelf zones and 7 species in the water of Varna Lake were found in bloom-causing concentrations. The highest quantities of phytoplankton were produced during the winter-spring period, with a trend toward increasing the numbers and phytoplankton biomass from 2014 to 2017. The ecological assessment based on results for the phytoplankton determined the ecological status of coastal and shelf water as “moderate” and the ecological status of Varna Lake water as “bad”.

6. Kostadinova, G., **D. Dermendzhieva**, G. Petkov, G. Beev, K. Koev. 2018. Evaluation of wastewater quality at the inlet-outlet of the most modern wastewater treatment plant in Bulgaria. *Fresenius Environmental Bulletin*, 27(12): 9723–9738. ISSN номер: 10184619, **IF=0.673** (2017/2018), **Q4**.

**Abstract.** The study was carried out during the period 2015-2016 based on 24 physicochemical and 5 microbiological wastewater (WW) parameters. WW samples were collected twice per month from both monitoring points (MPs) of the Municipal Wastewater Treatment Plant (MWWTP) - MP-1 (inlet) and MP-2 (outlet) and screened parameters were analyzed according to Bulgarian standards complied with ISO standards. For the estimation of total and specific microbial load, selective chromogenic culture medium sheets were used. Multivariate statistical technique was applied to analyze the data for different parameters. It was found the ranges of variability and trends of inlet-outlet WW values changes. The MWWTP demonstrated different removal efficiency (8.31-97.8%) referring to different WW parameters. 127 strong positive and negative correlations exist between controlled WW parameters. The parameters involved in the most numerous statistically significant correlations were T<sup>o</sup>C and Cl. EC at inlet/outlet affected at a great extent Factor 1 of Rotated factor loading matrix. The factor analysis determined MP as a factor influencing the largest number of parameters (14), followed by factors Month (7) and Year (2). PCA revealed different WW parameters at inlet-outlet that were affected by F1 and F2. The treated WW did not meet the requirements for discharge in the receiving water body (with respect to the total P content) and for irrigation (as fats content and the number of *E. coli*, *Enterobacteriaceae* and *Salmonella* spp. was concerned).

7. **Dermendzhieva, D.**, G. Kostadinova, G. Petkov, R. Nastova, I. Dineva. 2018. Agro-ecological assessment of Sokolitsa river water affected by open coal mining activity in the largest energy complex in bulgaria. *Bulgarian Journal of Agricultural Science*, 24 (Supplement 1), 169-179. ISSN номер: 13100351, **SJR=0.262** (2017), **Q3**.

**Abstract.** A study of Sokolitsa River was conducted with two monitoring points (MPs) – MP-1, before, and MP-2, after discharge of mining wastewater. The study was carried out during the summer months of the period 2013-2016 by assessing five physico-chemical indices, eight heavy metals and metalloids, and three biotic parameters, and the water quality as a natural source and as a source for irrigation. For the sampling of water, living organisms and sample preparation, international ISO and BSS references were used. Sample analyses were made by Multi 340i, spectrophotometric methods and AAS. Based on the obtained analytical results, the following main conclusions were drawn: a) ecological assessment of the river water as a natural source determines water in both monitoring points as water in ‘good ecological status’ by pH values and in ‘moderate ecological status’ by Dissolved oxygen, Electroconductivity, Ecological Quality Rang, IPS and Biotic index values; b) the priority pollutants levels - Cd, Pb and Ni do not exceed the environmental quality standards and determine the water in ‘good chemical status’; c) the average element concentrations for the study period decreased in the following order Fe>Mn>Zn>Cu>Pb>Ni>Cr>Cd, which are not risky for the hydroecosystem and for irrigated crops; d) assessment of the river water as a source for irrigation determines the water in both

monitoring points as appropriate for this purpose by all investigated parameters; e) the wastewater from open coal mining activities, discharged into the river has no significant impact on water quality as a natural source and as a source for irrigation.

8. Dinev, T., Beev, G., Tzanova, M., S., Denev, **D.**, **Dermendzhieva**, A., Stoyanova, 2018. Antimicrobial activity of *Lactobacillus plantarum* against pathogenic and food spoilage microorganisms: A review. *Bulgarian Journal of Veterinary Medicine*, 21(3): 253-268, DOI:10.15547/bjvm.1084, ISSN номер: 13111477, **SJR=0.134** (2016), **Q3**.

**Abstract.** One of the most important properties of probiotic bacteria is their antimicrobial activity against many species of microorganisms which could be useful to prevent food spoilage caused by certain sensitive bacteria and fungi as well as to control the speed of propagation of potentially pathogenic bacteria by probiotic application. *Lactobacillus plantarum* is considered one of the probiotic bacteria with broadest spectrum of antibacterial activity which makes it useful in veterinary, human medicine and food industry. According to a number of studies *Lactobacillus plantarum* exerts inhibitory activity against many Gram-positive and Gram-negative bacteria – *Escherichia coli* (including *E. coli* 0157:H7), *Pseudomonas aeruginosa*, *Helicobacter pylori*, *Yersinia enterocolitica*, *Campylobacter jejuni*, *Listeria monocytogenes*, *Staphylococcus aureus*, *Klebsiella*, *Salmonella*, *Shigella*, *Bacillus*, *Clostridium*, *Enterococcus*, *Lactobacillus* spp., etc. as well as a number of moulds and yeasts – *Aspergillus*, *Fusarium*, *Mucor*, *Candida* spp., etc. The main antibacterial compounds of *Lactobacillus plantarum* are the bacteriocins and organic acids whereas the antifungal compounds are the organic acids, hydroxy fatty acids and cyclic dipeptides. Because of the high antifungal activity of some *L. plantarum* strains against food spoilage microorganisms they can be used as effective biopreservatives in food industry. Also, some *L. plantarum* strains could be applied as supporting therapeutic agents in treatment of infections caused by the corresponding susceptible microorganisms.

9. Georgieva, N., Z. Yaneva, **D. Dermendzhieva**, 2017. Sorption equilibrium, thermodynamics and pH-indicator properties of cresyl violet dye/bentonite. *Water Science and Technology*, 76(5):1065-1080, DOI:10.2166/wst.2017.283, ISSN номер: 02731223, **IF=1.197** (2016/2017), **Q3**.

**Abstract.** The aim of the present study was to develop cresyl violet (CV)/bentonite composite system, to investigate the equilibrium sorption of the fluorescent dye on bentonite, to determine the characteristic equilibrium and thermodynamic parameters of the system by appropriate empirical isotherm models and to assess its pH-indicator properties. The absorption characteristics of CV solutions were investigated by UV/VIS spectrophotometer. Equilibrium experiments were conducted and the experimental data were modelled by six mathematical isotherm models. The analyses of the experimental data showed that bentonite exhibited significantly high capacity – 169.92 mg/g, towards CV. The encapsulation efficiency was 85%. The Langmuir, Flory-Huggins and El-Awady models best represented the experimental results. The free Gibbs energy of adsorption ( $\Delta G_0$ ) was calculated on the basis of the values of the equilibrium coefficients determined by the proposed models. The values of  $\Delta G$  determined by the Langmuir, Temkin and Flory-Huggins models are within the range - 20 to - 40 kJ/mol, which

indicates that the adsorption process is spontaneous and chemisorption takes place due to charge sharing or transfer from the dye molecules to the sorbent surface as a coordinate type of bond. The investigations of the obtained CV/bentonite hybrid systems for application as pH-markers showed satisfactory results.

10. Kostadinova, G., **D. Dermendzhieva**, G. Beev, G. Petkov, D. Pavlov, E. Valkova, 2017. Quality assessment of maritsa river water as a main source for irrigation in thracian valley, *Fresenius Environmental Bulletin*, 26 (7):4367-4374, ISSN номер: 10184619, **IF=0.425** (2016/2017), **Q4**.

**Abstract.** The water of many rivers all over the world is used for irrigation purposes. Maritsa River, located in the Thracian Valley, Balkan Peninsula, on the territory of Bulgaria, Turkey and Greece, is one of them. Apart the water quantity, the performance of irrigated agriculture depends also on its quality. In the present study, the quality of Maritsa River water as a source for irrigation was assessed at two monitoring points (MPs) in Bulgaria - MP-1 (upper river) and MP-2 (middle course of the river). The samples were taken in June and August 2014 and 31 physico-chemical and microbiological parameters were screened. Water sampling and preparation were performed according to Bulgarian standard complied with ISO standards. Physicochemical parameters were determined spectrophotometrically, by Multi/340i SET and AAS. For the estimation of total and specific microbial load, selective chromogenic culture medium sheets were used. It was found that river water quality meets the requirements of Bulgarian standard for irrigation water with respect to: temperature, pH, electrical conductivity, total hardness, Ca, Mg, dissolved oxygen, BOD<sub>5</sub>, COD, N-NH<sub>4</sub> (except for June), N-NO<sub>3</sub>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, P-PO<sub>4</sub> (except for August), suspended solids (except for June), Mn, Fe, Cu, Zn, Pb, Ni, Cd, Cr and As. Deviations from the standard were observed for all microbiological parameters at both MPs. The metal concentrations decrease in the order of Fe>Zn>Ni>Pb>Cr>Cu>As>Mn>Cd. Many significant correlations were revealed between controlled water parameters.

14.09.2022 г.  
Гр. Стара Загора

Изготвил:.....  
/гл. ас. д-р Д. Дерменджиева/