

## ***EDITORIAL COMMENT***

Dear readers,

In the first issue of the journal for 2025, edited on English language, you will have the pleasure and opportunity to get closer to newest scientific developments published in eight research articles. They are included in the five main rubrics, namely *Man and Biosphere*, *Microorganisms and Environment*, *Bioautomatics and Bioinformatics*, *Ecological and Sustainable Agriculture*, and *Forest Ecology and Biology*.

In a multidisciplinary study (rubric *Man and Biosphere*) numerous changes in the composition and structure of electrochemically activated waters (EAW) are described. The destructive effect of anolyte on various bacteria and viruses is reported. Another important issue concerns the beneficial influence of catholyte on the life processes in plants and animals. Considering the cheap production, the lack of special storage requirements and harmful effects on the environment, the preservation of activity for a long period of time and the beneficial effect on plants, animals and humans, EAW is revealed as a useful tool in healthcare, environmental protection, agriculture and industry. A number of controversial issues are also outlined that require further clarification. An important issue for humanity is the generated CO<sub>2</sub> emissions, which contribute to the increase in atmospheric temperature over the past 150 years. Until now, attempts to mitigate global warming have been based exclusively on reducing the concentration of CO<sub>2</sub> in the atmosphere. One of the problems with this approach, however, is that the lifetime of CO<sub>2</sub> in the atmosphere is very long and the effect of reducing CO<sub>2</sub> emissions on lowering atmospheric temperature will only become significant after decades. An interesting article proposes a rational technology for reducing or even stopping the increase in global atmospheric temperature by removing sensible heat from the atmosphere and transferring it to other media, such as water and/or land mass. One of the main advantages of this approach is that it has an immediate effect on atmospheric temperature.

As a result of military operations, soils are contaminated with shell fragments and shrapnel, composed mainly of iron. Currently, most studies on this topic are focused on the explosive residues. A recent study is presented in the rubric *Microorganisms and Environment*, which examines the mechanisms of soil contamination with metal compounds as a result of the war in Ukraine. They are the basis for the development of effective remediation strategies, one of which is the participation of microorganisms in the processes of iron transformation in the soil. It was in a model study that the interaction between soil microbiomes and ferromagnetic iron fractions, which simulate materials originating from shells and mines, was investigated. In the same rubric, extensive microbiological studies have revealed the antimicrobial activity *in vivo* of the essential oil of *Lavandula angustifolia* Mill. When administered daily in the feed ration of broiler chickens (concentration of 0.01% for 21 days), it has been shown a reduction more than two-fold in the number of Gram-negative bacteria, staphylococci and oval fungi with pathogenic potential compared to control chickens. Furthermore, their feces are much less dangerous for the environment as a source of pathogenic microorganisms compared to those of conventionally fed birds.

It is known that industrial flue gas emissions containing high amounts of CO<sub>2</sub> are a major concern of human society. Therefore, CO<sub>2</sub> capture using microalgae in closed innovative photobioreactors (PBR) is a rational approach. In an article from the rubric *Bioautomatics and Bioinformatics*, a mathematical analysis of the processes in PBR for CO<sub>2</sub> removal from biogas by microalgae is made. The model describes the conditions of mixing of two phases (gas-liquid) in a sectioned PBR and is analyzed for different gas loading, where reverse flows can affect the residence time of air bubbles and part of the biomass in the sections of the PBR. This has a direct impact on the so-called flashing light effect (FLE) inside the vessel and is an important theoretical basis for revealing the metabolic mechanisms of photosynthesis and improving cell growth and CO<sub>2</sub> utilization from biogas.

A number of studies are focused on limiting the negative effects of climate change. An article from the rubric *Ecological and Sustainable Agriculture*, presents results of research and solutions for environmental protection, focused on sludge from wastewater treatment plants, their safety and possible application, changes in the soil resulting from their use as a soil improver, etc. The goal is to find the most effective and rational technological solutions for their utilization and environmental protection. The same

rubric also includes an article presenting the possibilities for applying the triangulation method in agroecological, ecological and sociological research in Bulgaria. In cases where it is necessary to compare results from multivariate analyses obtained from different data on the same territory or obtained from different analyses of the same parameters, the use of the so-called "Procrustes analysis" is appropriate. Its application is also illustrated in the search for interrelationships between crop yields and soil texture, as well as the hydraulic properties of the soil.

Modern forestry and forest soil science define soil as the main ecological factor for the existence of forests, the importance of which is comparable only to that of climate. It is generally accepted that in regions with similar climatic conditions, the growth and productivity of forests are determined primarily by the composition and properties of the soil. An article from the rubric *Forest Ecology and Biology* presents results from a study of gray forest soils (gray Luvisols) under different types of forests and in an unforested area. The observed differences in the morphological structure of the soil between forested and unforested areas emphasize the critical role of forest vegetation in the formation of the composition and properties of the soil. The study establishes that the characteristics of tree species influence the variations in the nitrogen content of the soil, pH and the C/N ratio.

Dear readers, this year our journal celebrates its 25th anniversary! The journal was created and continues to be an organ of the non-governmental organization "Ecological Engineering and Environmental Protection". The main merits for its founding belong to Assoc. Prof. Ivan Simeonov (Chairman of the Governing Board of this NGO), Academician Alexander Alexandrov and Prof. Plamen Angelov. Founded at the beginning of the century, with great creative and scientific enthusiasm and responsibility to the scientific community, the journal continues to excite its readers and contribute to the development of a number of current scientific topics related to environmental protection and monitoring, microbial and plant biotechnologies, bioinformatics and mathematical modeling, agrarian sciences, eco-technologies for water and soil purification, space technologies, etc. Having an interdisciplinary profile, it is a kind of bridge between rapidly developing areas on the border between biology and technical sciences, and contributes greatly to the integration of specialists working in the field of transfer and implementation of eco-technologies, as well as to the training of doctoral students, bachelor's and master's degree students and postgraduates.

I cordially congratulate all members of the Editorial Board, scientists, specialists and all readers on the occasion of its 25th anniversary!

Enjoy reading and let us continue our publishing and science promotion activities successfully!

Prof. Hristo Najdenski, DSc  
Member of BAS  
Editor-in-Chief