

STATEMENT

By Professor Daniela Marinova Nikolova, PhD

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Regarding the competition for the occupancy of the academic position „Associate Professor“ at the Sofia University „St. Kliment Ohridski“, in the professional field 4.3. Biological Sciences (Ecology and protection of ecosystems - Ecology of microorganisms) for the needs of the Department of Ecology and Environmental Protection, Faculty of Biology, SU „St. Kl. Ohridski“, announced in SG ed. 88 on 13.10.2020

In the announced competition the only candidate is Chief Assistant Professor Dr. Silvena Boteva, who presented all the necessary documents according to the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria.

Brief biographical data about the candidate. Dr. Silvena Boteva graduated in 2005 with a master's degree of Environmental Protection at Sofia University „St. Kliment Ohridski“, and in 2011 she successfully defended her PhD thesis entitled „Structure and functions of bacterioplankton from the circus of the Seven Rila Lakes - Rila National Park“. Dr. Silvena Boteva has almost 14 years of experience in the specialty. For about 5 years she worked as an expert-ecologist in the Research Sector at the Technical University and in the company EnviroTech Ltd., which contributes to her wide specialization in the field of ecology. Since 2014 Dr. Silvena Boteva is Chief Assistant Professor at the Department of Ecology and Environmental Protection at the Faculty of Biology, Sofia University, where she performs scientific and teaching activity. The career growth and the professional qualification of the candidate fully correspond to the topic of the announced competition for Associate Professor in the Department of Ecology and Environmental Protection.

Teaching activity. The teaching activity of Chief Assist. Prof. Boteva is very high and diverse and includes conducting various lectures and practical classes. For the last three years (2017-2020), her average total and academic study employment is 569 and 447 hours, respectively. Silvena conducts several practical exercises in the course of *Ecology and Environmental Protection* on the topics: Microbocenosis, Bioindication of polluted air, Bioindication of polluted soils, Allelopathy for students, Bachelor's degree at the Faculty of Biology from specialties Ecology, Biology, Biology and Chemistry, Biology and Geography, Biomangement and Sustainable Development, Molecular Biology, Biotechnology, as well as for the speciality Ecochemistry at the Faculty of Chemistry and Pharmacy - Sofia University. Besides, Dr. Silvena Boteva participates in conducting summer training practices in Ecology at the Department of Ecology and Environmental Protection at the Faculty of Biology. Silvena also leads the practical exercises of the courses: *Waste Management, Soil Science and Environmental Monitoring* for Students, Bachelor's degree, as well as exercises in *Ecology of Microorganisms* in the Master's program „Ecology“ at the Faculty of Biology. In addition to practical classes, Dr. Silvena Boteva also conducts a number of lecture courses: *Soil Science,*

Environmental Impact Assessment, Ecological Footprint, Alternative Energy Sources, Mapping and Evaluation of Ecosystem Services for students of different specialties, Bachelor's and Master degree in the Faculty of Biology at Sofia University, and lectures on *Procedures for Environmental Impact Assessment and Complex Permits* for Students, Master's Degree, at the Technical University - Sofia. Silvena is the author of the programs of most of the lecture courses. Dr. Boteva has been the scientific supervisor of 11 graduates - 3 from the Faculty of Biology at Sofia University and 8 from the Technical University, Sofia, who have successfully defended their diploma works. In conclusion, I highly appreciate the overall teaching activity of Dr. Silvena Boteva, given its large volume and diversity.

Research activity and achievements. The main research profile of Chief Assist. Prof. Silvena Boteva is in the field of ecology of microorganisms. Her research interests are focused on studying the impact of various pollutants such as fungicides, radionuclides and heavy metals, oil and methane on soil microbial communities, the impact of environmental conditions on the structure and dynamics of pelagic microbial communities, eco-toxicological analyzes, use of remote sensing methods in the field of ecology. They are reflected in high publishing activity, development of numerous research projects and collaborations with researchers from other countries.

For the competition 2 chapters of books and 22 scientific articles, of which 19 published in specialized scientific journals, indexed in WoS /SCOPUS such as *Environmental Science and Pollution Research, Ecotoxicology and Environmental Safety, Environment, Development and Sustainability, Comptes rendus de l'Académie Bulgarian of Sciences* are presented. One of the two book chapters is published by the authoritative scientific publishing Springer. In 8 of the 22 scientific articles submitted for the competition, Dr. Boteva is the first co-author, in 6 articles as well as the both chapters of books she is the second co-author. In the remaining 8 articles she ranks third and next in the author's team. The co-authorship in the scientific works shows close cooperation with a number of colleagues, both from our country and from abroad. The total impact factor of the publications submitted for participation in the competition is 16,541. Proof of the importance of the papers of Chief Assist. Prof. Boteva is their citation. The candidate has presented 131 citations, most of them by foreign authors in specialized international journals, referenced and indexed in WoS/SCOPUS, PhD dissertations and books; h-index: 4 (Scopus). Chief Assist. Prof. Silvena Boteva has also participated in 36 scientific conferences - 25 international and 11 national conferences, including the *7th International conference on sustainable solid waste management, Greece, World Multidisciplinary Earth Science Symposium, WMESS, Czech Republic, International seminar of Ecology, Bulgaria.*

The scientific researches of Dr. Silvena Boteva are relevant and have scientific and applied value. They cover 4 scientific fields, described precisely in the author's report on the contributions - 1. Influence of pollutants on soil microbial communities; 2. Microflora of alpine lakes; 3. Eco-toxicological analyzes; 4. Remote sensing methods in the field of ecology. The first scientific field has the most publications. Modern molecular and remote sensing methods in the field of ecology have been used in the research. I fully accept the report on the contributions of the research of Chief Assist. Prof. Boteva, which are described

in detail. Among the more significant contributions, according to the main scientific fields in which the candidate works, the following can be mentioned:

Influence of pollutants on soil microbial communities - The impact of various pollutants - fungicides, radionuclides and heavy metals, oil and methane on soil microbial communities are studied and certain dependencies are revealed. Of great scientific and practical significance are the results revealing that azoxystrobin selects aminoglycoside antibiotic-resistant bacteria even at the lowest dose of fungicide recommended by the manufacturer. It is found that the use of azoxystrobin to protect crops may be a possible route of transmission of antibiotic resistance to humans. In terms of enzyme activity, the values show that four months after treatment of the soil with azoxystrobin, the activity of soil enzymes is still not restored.

Heavy metal pollution is confirmed to alter the abundance and activity of soil microbial communities, and in most cases these changes correspond to metal concentrations and their bioavailability.

Microflora of alpine lakes - This area is a continuation of the PhD dissertation of Silvena. The dynamics of the number and diversity of bacterioplankton from Bubreka Lake and Okoto Lake from the circus of the Seven Rila Lakes are analyzed. Through the use of modern molecular methods (ARDRA) for the first time in our country the taxonomic composition of microorganisms and changes in bacterial diversity in time and seasonal aspect has been identified, which makes it possible to understand the structure and dynamics of pelagic microbial communities in alpine lakes, which are little studied in this aspect.

Eco-toxicological analyzes - The main tendencies in the development of the eco-toxicological researches are established and the main directions in the development of the ecotoxicology and the use of new indicators for assessment of the risk and the condition of the ecosystems are outlined. The effect of herbicides paraquat and glyphosate is studied using test objects cress (*Lepidium sativum* L.) and radishes (*Raphanus sativus* var. *Radiculata* L.) on a set of parameters related to seed germination and plant viability, which reveal significant changes in herbicide-treated plants. Thus, based on the performed molecular analyzes (PCR), mutational rearrangements in the DNA of the treated plants are established. In addition, the possibility of using cress as a test object for soil monitoring is studied, using samples from points of the National Environmental Monitoring System. The conducted experiments present opportunities for application of new bioassays.

Use of remote methods in the field of ecology - Two methods are analyzed - based on pixels and based on objects, for classification of land cover and land use of satellite images, as a result of which it is found that the method of reference vectors is the most suitable for identification of land cover and land use classes. Using a digital elevation model, the relationship between geomorphology and land cover types in the region of Sithonia, Greece, as well as the combined influence of environmental factors and human intervention on the distribution of vegetation in the area of Crete was studied and in this way the applications of modern remote sensing methods in the field of ecology are expanded.

Dr. Silvena Boteva participated in 7 scientific and educational projects, of which one international under the European Union program for transnational cooperation „Balkans - Mediterranean Sea 2014 – 2020“ and 6 national projects funded by the Research Fund of Sofia University, Research fund at the Ministry of Education and Science and under the Financial Mechanism of the European Economic Area. In the three projects, in support of doctoral students at Sofia University, Chief Assist. Prof. Boteva is the head. Her knowledge in the field of ecology and environmental protection is also reflected in the preparation of numerous environmental impact assessment reports, waste management programs, environmental assessments, comprehensive quality permits. All this testifies to her active scientific-organizational and expert activity, to her ability to work in a team with other researchers.

Conclusion

The publications of Dr. Silvena Boteva and the contributions reflected in them, the participation in research projects and conferences outline her as a prominent scientist in the field of ecology of microorganisms, whose works are well known both in Bulgaria and in the international scientific community. Her teaching activity is large and diverse. She has supervised a large number of graduates. Based on the analysis of the overall teaching and research activity of Chief Assistant Professor Dr. Silvena Boteva, I believe that she fully meets the requirements for holding the academic position of „Associate Professor“ under the Law on the Development of Academic Staff in the Republic of Bulgaria, the Regulations for the implementation of this law, and the Rules on the conditions and procedure for acquiring science degrees and holding academic positions in Sofia University „St. Kliment Ohridski“. As a member of the Scientific Jury of the announced competition, I give a positive assessment and recommend that the members of the Honorable Faculty Council of the Faculty of Biology vote positively for the election of Chief Assistant Professor Dr. Silvena Boteva in the academic position „Associate Professor“ in the professional field 4.3. Biological sciences (Ecology and protection of ecosystems - Ecology of microorganisms).

Statement prepared by:

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