



Review

regarding the competition for the position of "associate professor" in the scientific specialty: Ecology and Ecosystem Protection announced in SP issue 7 of January 23, 2024, with candidate Slaveya Tencheva Petrova by Mariyana Ivanova Lyubenova, Professor, PhD, appointed according to Order No. RD – 16 - 403/20.03.2024 of the Rector of the Agricultural University – Plovdiv as a member of the scientific jury.

Reviewer: Professor, PhD, Mariyana Ivanova Lyubenova, Sofia University "St. Kliment Ohridski", field of higher education: 4. Natural Sciences, Mathematics and Informatics, professional direction: 4.3. Biological Sciences, scientific specialty: Ecology and Ecosystem Protection; appointed as a member of the scientific jury by Order No. RD -16- 403 /20.03.2024 of the Rector of the Agricultural University.

1. General data on the candidate's career and thematic development;

The candidate completed secondary education in 1996 at the "Prof. Dr. Asen Zlatarov" Foreign Language High School in Haskovo, with proficiency in French (good level) and English (excellent level). In 2006, she graduated with a bachelor's degree in Ecology, and later in 2008 with a master's degree in Ecology from „Paisii Hilendarski“ University in Plovdiv, with excellent success. She defended her doctoral dissertation on the topic of "Passive and Active Phytomonitoring of Atmospheric Pollution in the City of Plovdiv" in 2012 at the same university. Since 2011, she has been employed under a permanent contract at the Faculty of Biology of „Paisii Hilendarski University“ in Plovdiv, and since 2013, she has been appointed as a senior assistant professor at the same university. The total work experience is 18 years, 2 months, and 16 days, of which 13 years and 19 days are teaching experience (as of April 20, 2024). Since 2017, she has been on her second employment contract (initially 2 hours, and from 2023 – 4 hours) at the Faculty of Plant Protection and Agroecology, the Agricultural University - Plovdiv, where her incomparable to an 8-hour working day teaching experience amounts to 7 years (as of April 20, 2024). Since 2017, the candidate has completed 9 courses to enhance her qualifications: Postgraduate qualification as a Teacher in Ecology and Ecosystem Conservation, Branch "Lyuben Karavelov" - Kardzhali (2017-19); training under Project BG05M2OP001-2.011-0001 "Support for Success" (Certificate No. 619/14.09.2020, Ministry of Education and Science); Postgraduate qualification as a Teacher in Biology, Department for Continuing Professional Education and Lifelong Learning at „Paisii Hilendarski“ University (2019-20); training on Introduction in Artificial Intelligence and Statistics with practical examples – intensive course for academic staff under the Erasmus+ Programme Project No: 2021-1-RO01-KA220-HED-000030286 (16-18.01.23); training on working with the ANTIPLAGIAT platform, „Paisii Hilendarski“ University (24.02.23); training under the OMNIA project, „Paisii Hilendarski“

University – Enhancement of digital skills (27.03-18.05.23); training on Health and Safety at Work (01-02.11.23); training on Innovative Educational Technologies, „Angel Kanchev“ University (22.29.01.24) and training on "School in the Cloud: Content Creation", Center for Creative Learning, Plovdiv (22.03 and 29.03.24).

2. General description of the submitted materials;

For the associate professor position, Slaveya Petrova has submitted all necessary documents. The complete list of publications includes 49 works: 3 related to the doctoral dissertation; 12 publications with impact factor; 10 publications in peer-reviewed scientific journals; 7 conference papers and 15 posters in conference proceedings; 1 textbook and 1 study guide. The personal contribution of Dr S. Petrova to the overall scientific output (the mentioned 46 works) is illustrated by the fact that 1 publication is independent; she is the first author in 20 publications; the second author - in 9 works, and the third and subsequent author - in the remaining 16 publications. In the competition for the "associate professor" position, Slaveya Tencheva Petrova participates with a total of 25 scientific works, grouped as follows: Scientific publications in the nominal specialty – 25 in total, among them: publications related to the doctoral dissertation – 3, which are not subject to review; publications with impact factor – 12, and publications in peer-reviewed scientific journals – 10. Dr S. Petrova's personal contribution to the mentioned 22 works is as follows: 1 work is independent, she is the first author in 9 works, and in half of the publications with impact factor, she is the first author; she is the second author in 4 works, and the third and subsequent author in the remaining 9 publications. For the purpose of this review, 22 publications, referenced and indexed in the world's scientific databases (Web of Science and Scopus), are analyzed, among which 4 publications are in journals with Q2; 8 publications - with Q3; and 10 publications - with Q4.

3. Main research directions of the candidate. Demonstrated skills or inclinations for leading scientific research (project management, attracting external funding, etc.);

The candidate has diverse scientific interests, and the results of her research are quite comprehensive. Overall, her research falls within the field of ecology, protection, and sustainable environmental management. Roughly, the following 4 main directions can be outlined: 1) Ecology, protection, and sustainable management of urbanized ecosystems – 10 publications: B2, B3, B6, B9, C1 - C3, C8, C9, and C12; 2) Ecology and sustainable management of natural ecosystems – 6 publications: B5, B10, C4 – C7; 3) Biological agriculture – 4 publications: B1, B7, B8, and C11; and 4) Cultivated varieties of sorghum – 2 publications:

B4 and C10. *Regarding direction 1)*, the research is related to conducting active and passive monitoring of air pollution in the city of Plovdiv using woody, herbaceous species, moss and lichenized fungi collectors, and a set of morphological, physiological, and biochemical parameters; comprehensive studies have been conducted on the state of soils and soil communities using specific coefficients to assess anthropogenic pollution and the migration of elements; an algorithm for assessing ESs in urbanized ecosystems has been developed; a study has been conducted on the impact of the work environment and harmful habits on human reproductive capabilities. *Regarding direction 2)*, ecotoxicological studies have been conducted with *Cyprinus carpio* Lin., *Perca fluviatilis* Lin., and *Scardinius erythrophthalmus* Lin. in the catchment area of the Topolnitsa River – acute and chronic bioassays, histological, histochemical, and biochemical studies; microbial communities in the rhizosphere of a protected species from the Strandzha region have been studied, and measures for sustainable management of the natural park have been developed. *Regarding direction 3)*, the effect of various agricultural practices (plowing, mowing, irrigation, pest control, and soil analysis) on soil macro- and micro fauna in an organically managed apple orchard of the Agricultural University has been studied; allelopathic relationships in agrophytocenoses for mixed cultivation of crops (tomatoes, parsley, carrots, dill, and onions) have been investigated; a study on the pollution of agricultural land with microplastics and their uptake by plants has been conducted. The ecotoxicological study with pea plants demonstrates bioaccumulation in the roots and bioconcentration of microplastics in the stem and leaves, as well as a decrease in photosynthesis intensity. *Regarding direction 4)*, the influence of growth regulators on the germination and growth of plants has been studied, as well as the selection of suitable donors for hybridization to enhance the temperature tolerance and adaptive potential of plants. According to the provided reference, Ms. S. Petrova has participated in a total of 6 scientific projects, 3 of which are national scientific projects under the Ministry of Education and Science: "Digital Sustainable Ecosystems - Technological Solutions and Social Models for Ecosystem Sustainability (DUES)" (2023-26) at PU; National Scientific Program "Intelligent Plant Production" (2021-24), at AU; and "Model for Sustainable Management of Urban Soils through the Establishment of Vegetative Buffer Green Areas around Transport Arteries Aimed at Improving Quality of Life" (2018-23), at PU. She participates as an expert in a project under the Ministry of Agriculture on "Preparation of an analysis on the impact of agriculture on the state of the environment and climate change" (the groups "Air quality" and "State of the forest fund"); also in the national project ICT-AGRI-FOOD at AU "Circular agriculture in mixed farming systems with a focus on reducing greenhouse gases (CONNECTFARMS)" and in the national

project CORE Organic on the topic "Development of intercropping systems with camelina to increase yield and quality parameters of locally underutilized crops (SCOOP)". Dr. S. Petrova demonstrates significant activity as a participant in scientific projects and also shows experience in coordinating, managing, and administering scientific and educational projects. She has also participated as an academic supervisor in the project "Students practice" under the Ministry of Education and Science. She is the leader of a project at AU and of internal university projects at PU in the sessions "Student Projects" and "Young Scientists and Postdoctoral Researchers".

4. Evaluation of the pedagogical training and activity of the candidate. Their role in training young scientific personnel;

So far, the candidate has delivered lectures and exercises under a basic employment contract at the Department of Ecology and Environmental Protection in the Faculty of Biology at "Paisii Hilendarski" University of Plovdiv in Bachelor's and Master's degree programs. Additionally, she has given lectures and exercises under her second employment contract at the Department of Microbiology and Environmental Biotechnology at the Agricultural University - Plovdiv, Faculty of Plant Protection and Agroecology in Bachelor's and Master's degree programs. According to the provided reference from AU regarding the teaching workload of Dr. S. Petrova for 5 years (2018/19 - 2022/23), she has conducted a total of 945.6 hours, including 544 hours of lectures, 227 hours of exercises, and 174.6 hours of non-auditory workload (equated to exercises), which amounts to approximately 54 hours of lectures per year (exceeding the required minimum of 30 hours). The candidate teaches courses such as "Geology with Petrography" and elective courses "Geoecology of Urban Systems," "Biosystematics, Phylogeny, and Evolution," and "Environment and Health" for the Ecology and Environmental Protection degree program, with the latter also for the Plant Protection degree program in the Bachelor's level. Two elective courses: "Ecological Ethics and Urbanization" and "Statistical Methods in Ecology" are taught for the Master's degree program. She has supervised 3 graduates at AU in the Bachelor's program and 38 - at PU, including 24 in the Bachelor's program and 14 in the Master's program. She is the author of the educational programs for the mentioned courses. The candidate has published a textbook "Biological Agriculture and Agrobiodiversity" (2017) and an educational guide "Pollution, Water Conservation, and Ecosystem Impact" (2015).

5. Significance of the achieved results, demonstrated through citations, publications in prestigious journals, awards, membership in international and national scientific organizations, etc.;

Dr. Slaveya Petrova is a recognized author in the scientific community both domestically and internationally. She has received 141 citations, and for the purposes of this competition, she has presented 35 citations of foreign publications for 1 her publication. While the provided information does not allow for a comprehensive assessment of the citation impact of her scientific output, it can be noted that the provided citations are from 27 prestigious journals with a combined SGR=19.922 and IF=12.3. Regarding quartiles, 7 citations are from Q1 journals, 16 from Q2 journals, 4 from Q3 journals, and 1 citation is from a Q4 journal. In terms of citation dynamics, there were 22 citations from 2015 to 2019, and 13 citations from 2020 to 2024, considering that 2024 has not yet concluded. Some of the journals citing her work include: Environmental Monitoring and Assessment; Environmental Science and Pollution Research; Water, Air and Soil Pollution; Forests; Landscape; Ecological Engineering; Bulletin of Environmental Contamination and Toxicology; Environment Earth Sciences; Environmental Pollution, and others. The total impact factor of the works with which the candidate is applying for the competition is 10.671. Her publications are in renowned journals such as: Atmospheric Pollution Research; Arh Hyg Rada Toksikol; Oxidation Communications; Applied Ecology and Environmental Research; Land; Biologia; Comptes rendus de l'Academie bulgare des Sciences; Bulgarian Journal of Agricultural Science, and Ecologia Balkanica. The candidate has an h-index of 8 (according to Scopus).

Dr. S. Petrova is a member of: the Union of Scientists in Bulgaria (USB) Plovdiv and she is the Deputy Chairperson of the Biology Section; MENSA – Bulgaria; the Editorial Board of the journal "Ecologia Balkanica," and the Non-Profit Association "Ecological Society EcoExpert" (Chairperson). Additionally, she serves on two Public Expert Councils for the Municipality of Plovdiv - on greenery and air quality.

In her current position, chief assistant S. Petrova demonstrates admirable teamwork skills, excellent communication, when working with students and pupils, and is a proficient organizer of scientific forums, seminars, training sessions, environmental initiatives, competitions, field practices, visits, and more.

6. Significance of contributions to science and practice. A motivated answer to the question of how the candidate's profile clearly defined in her scientific work;

The candidate has a clearly defined profile in her research work, which includes studies in the field of ecology - urban ecology, agroecology, and ecology of natural systems, as well as protection and sustainable management of ecosystems. In her scientific publications, 25 contributions can be identified - 9 applied, 6 scientific, 5 methodological, and 5 original contributions.

I. ORIGINAL CONTRIBUTIONS

- 1) Active biomonitoring using moss and lichenized fungi collectors for assessing atmospheric pollution in the city of Plovdiv was applied.
- 2) Comprehensive studies on the state of key components of the urban ecosystem (soils, soil communities, green infrastructure, etc.) in the city of Plovdiv were conducted.
- 3) Research on the mobile forms of established pollutants and assessment of the ecological conditions and status of urbanized soils in Plovdiv were conducted.
- 4) Studied microbial communities in the rhizosphere of the protected species *Cicer montbretii* Jaub. & Spach.
- 5) Tested the influence of Cycocel as a growth regulator on cultivated sorghum varieties.

II. METHODOLOGICAL CONTRIBUTIONS

- 1) Confirmed the advantages of biomonitoring compared to instrumental methods in assessing the state and possible changes in air quality.
- 2) It was applied an urban gradient in comprehensive ecological studies of urban soils to identify pollutants and their sources.
- 3) It was used a set of specific coefficients to assess the anthropogenic impact on urban soils and the migration of elements in the urban environment.
- 4) Developed an algorithm for assessing ecosystem services in urbanized ecosystems.
- 5) Presented opportunities for implementing various agricultural practices aimed at sustainable management of soil biodiversity.

III. SCIENTIFIC CONTRIBUTIONS

- 1) Ratios of chlorophyll a/chlorophyll b and total chlorophyll/carotenoids have been confirmed as effective biomarkers for biomonitoring purposes.
- 2) It has been confirmed that the negative impact of pollutants manifests during the photosynthetic process before leaf damage occurs.
- 3) Ecotoxicological tests have been conducted on the behavior, survivability, and respiratory processes of fish under the influence of single and combined exposures to heavy metals (Cd, Ni, Pb, Zn) in laboratory conditions.
- 4) It has been confirmed that the factors "chemical element" and "organ type" have greater significance for the degree of bioaccumulation and bioconcentration of heavy metals in fish from polluted water bodies compared to the factors "season" and "fish species."
- 5) Histological and histochemical changes have been confirmed as compensatory-adaptive mechanisms for the survival of fish in waters polluted with heavy metals.
- 6) The transfer of microplastics from soil to crop plants through the root system and their bioaccumulation, as well as bioconcentration in stems and leaves, has been demonstrated.

IV. APPLIED CONTRIBUTIONS

- 1) Passive and active biomonitoring of atmospheric pollution in the city of Plovdiv has been conducted using various anatomical-morphological, physiological, and biochemical parameters of objects such as lichenized fungi, mosses, grass species, and tree species.
- 2) It has been confirmed that the species *Acer platanooides* L., *Acer heldreichii* Orph.ex Boiss, *Aesculus hippocastanum* L., *Betula pendula* Roth., *Plantago lanceolata* L. can be successfully used for biomonitoring of atmospheric pollution in urban environments.

- 3) Based on 8 years of research (2010-2018), it has been demonstrated that the atmospheric air in Plovdiv city is of poor quality (more pronounced in the CZ and in the residential areas located in the E and SE) and has a negative impact on the city's green infrastructure.
- 4) The negative impact of waters from the Topolnitsa River watershed on *Cyprinus carpio* Lin., *Perca fluviatilis* Lin., and *Scardinius erythrophthalmus* Lin. has been demonstrated through acute toxicity bioassays.
- 5) The activity of hepatic enzymes in fish has been confirmed as an effective biomarker for assessing the state of aquatic ecosystems polluted with heavy metals.
- 6) Biomarkers for the impact of microplastics on plants have been proposed.
- 7) Sorghum varieties possessing genes with desired traits have been selected to be used as donors in breeding programs.
- 8) The key role of allelopathy in regulating weed density in agrophytocenoses has been confirmed, and the potential of allelopathy to regulate the physiological and morphological characteristics of crops has been investigated.
- 9) The advantages, opportunities, vulnerabilities, and threats to the protection of biodiversity and ecosystems in the territory of the Strandzha Nature Park have been analyzed.

7. Critical Notes and Recommendations;

The lists of publications and citations are not arranged chronologically by year. Information about the indexing of the journals where the author's publications are cited is not provided. I recommend deepening the research in the field of organic farming and promoting good agricultural practices.

8. Personal Impressions and Reviewer's Opinion;

I have personal impressions of the candidate's scientific work as a reviewer of projects for the Ministry of Education and Science related to monitoring atmospheric and soil pollution. Slaveya Petrova emerges as a researcher with diverse interests, resourceful and inventive. Dr Slaveya Petrova has 440 points according to indicators: A – 50 points; B – 120 points; C – 200 points; and D – 70 points. According to the minimum national requirements for scientific and teaching activities (The RILDASRB), the required points are 400. In addition, she has presented points for the non-mandatory indicator E (20 points), and the actual points for this indicator are 190 – 130 points for participation and leadership in projects and 60 points for publishing a university textbook and teaching guide.

Conclusion

Based on the analysis conducted on the pedagogical, scientific, and scientific-applied activities of the candidate, I believe that Slaveya Tencheva Petrova meets the requirements of the The Law on the Development of the Academic Staff in the Republic of Bulgaria, and the Regulations for the implementation of the LDASRB, and the Regulations of Agricultural University for its Implementation.

The candidate holds a PhD for over 12 years and has 7 years of teaching experience at the Agricultural University. She has completed 9 qualification enhancement courses. Dr S. Petrova teaches 1 mandatory course and 5 elective courses and has developed teaching programs for them as well as 1 textbook and 1 teaching guide. She has the required number of lecture hours, and also successfully supervised graduating students. She has participated in 6 research and 4 educational projects. The candidate has 12 publications with an Impact Factor (10.671), and in

50% of them, she is the first author. Dr S. Petrova is recognized in the scientific community - she has 141 citations (35 citations per one publication in prestigious journals were presented) and 25 contributions, 5 of which are original. Dr Petrova has 440 points, which is with 40 points above the minimum requirements. All of this gives me grounds to EVALUATE her overall activity POSITIVELY.

I would like to suggest to the esteemed Scientific Committee to also vote positively, and the Faculty Council of the Faculty of Plant Protection and Agroecology at the Agricultural University - Plovdiv to elect Slaveya Tencheva Petrova as an "associate professor" in the scientific specialty "Ecology and Ecosystem Protection."

Date: 24.04.2024

City of Plovdiv

Reviewer:



(Prof. Mariyana Lyubenova)