

APPROVED MEMBER
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Signature 09.11 23

REVIEW

regarding the competition for "professor" in the scientific specialty "Ecology and ecosystem protection", announced in SG no. 62 of 21.07.2023 with candidate Stefan Ivanov Shilev by Prof. Ph.D Eng. Violina Angelova Rizova, appointed according to Order No. PD 16-898/25.09.2023 of the Rector of the Agricultural University - Plovdiv as the chairman of the scientific jury

Reviewer: Prof. Ph.D. Eng. Violina Angelova Rizova, Agricultural University-Plovdiv, field of higher education: 4. Natural sciences, mathematics and informatics, professional direction 4.4 "Earth sciences", scientific specialty "Ecology and ecosystem protection" appointed chairman of the scientific jury by order No. RD-PD 16-898/25.09. 2023 of the Rector of the Agricultural University.

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

Associate Professor Dr. Stefan Ivanov Shilev was born on 06.12.1973. He completed his higher education in 1996 at the Agricultural University-Plovdiv and obtained the qualification of "agronomist engineer" with a specialty in "Plant Protection" (master's degree). In 1998, he joined the Department of "Microbiology and Environmental Biotechnologies" in the Faculty of "Plant Protection and Agroecology" at the Agricultural University-Plovdiv as an "assistant". In 2003, he defended his doctoral thesis on "Phytoremediation of soils contaminated with heavy metals: application of the *Pseudomonas fluorescens* - *Helianthus annuus* system" at the University of Córdoba, Spain. In 2010, he received the scientific title of "Associate Professor" in the scientific specialty "Ecology and Ecosystem Protection" (Ecology of Microorganisms).

The candidate's professional development is related to raising the level of teaching and scientific work through participation in trainings related to waste management and restoration of mining areas in Germany and Italy in 2007, 2008 and 2009 and specializations (Faculty of Biology) of Sofia University "Kliment Ohridski" (1998), University of Cordoba - Spain (1999-2000, 2007 with a scholarship of the Ministry of Foreign Affairs of Spain;, 2008 - under project PD-7 of FNI at MES), NATO - Advanced Study Institute: "Phytoremediation of contaminated soils", Trest, Czech Republic (2002).

The experience gained as "director" of the "Ecology and Waste Management" Directorate in the Municipality of Plovdiv (2012-2014), director of "Regional Inspection on the environment and waters", Plovdiv, Ministry of Education and Culture (2014-2020), national representative" in the 47th and 48th National Assembly of the Republic of Bulgaria.

Assoc. prof. Dr. Stefan Shilev actively participates in the activities of the University as: member of the Faculty Council of the Faculty of Plant Protection and Agroecology, member of the Academic Council of AU-Plovdiv (2007-2011 and from 2020), member of

the Commission on FRZA Erasmus program (from 2020), member of the eligibility committee under PN 4.4. (since 2020), Member of the Management Board of the Center for Scientific Research, Technology Transfer and Protection of Intellectual Property (since 2020), Member of the Temporary Scientific Expert Commission at the Scientific Research Institute under PN 4.4. Earth Sciences (2021 and 2023), Chair of the AU General Assembly (2020-2021)

He speaks Spanish, English and Russian.

2. General description of the presented materials.

In the competition for "Professor" Associate Professor Stefan Shilev participated with a total output of 26 papers, grouped as follows:

- Scientific publications on the nomenclature specialty - 26 issues, of which:
 - Publications with an impact factor – 12 issues
 - Publications in peer-reviewed and refereed scientific journals – 8 issues;
 - Publications in non-refereed journals with scientific reviews and edited scientific volumes – 5 issues;
 - Chapter of a collective monograph – 1.

- Study guides – 1 item.

The personal participation of Assoc. prof. Dr. Stefan Shilev in the mentioned 26 works is illustrated by the fact that 3 of them are independent, in 11 - he is the first, in 3 - he is the second, and in the remaining 9 - he is the third and subsequent author.

To prepare the opinion, 26 items are subject to analysis.

Twenty of the scientific works are referenced and indexed in the world databases Web of Science and Scopus. Fourteen of them have an impact factor or impact rank, with 6 of them in journals in Q1, 1 in Q2, 5 in Q3 and 2 in Q4. The total impact factor of the presented publications is 31.679.

From the presented reference, it is clear that the candidate meets and even exceeds the national minimum requirements necessary to occupy academic position "Professor".

3. Main directions in the candidate's research work. Demonstrated skills or aptitude for leading scientific research (project management, attracted external funding, etc.).

Assoc. prof. Dr. Stefan Shilev participated in the competition in a total of 17 research and applied projects. From them:

- 7 pcs. international scientific and scientific-applied projects

- 7 pcs. national scientific and scientific-applied projects;
- 3 pcs. funded by AU

Assoc. prof. Dr. Shilev is the head of 12 projects (7 international, of which 3 are financed by the "Scientific Research" fund and 2 are financed by AU-Plovdiv). As a project manager, Prof. Dr. Shilev has attracted over BGN 650,000 for the Agricultural University.

4. Assessment of the candidate's pedagogical training and activity. Its role in the training of young scientific personnel.

Assoc, prof. Dr. Stefan Shilev has been an assistant in the Department of Microbiology at the Faculty of Plant Protection and Agroecology at AU-Plovdiv since 1998 with over 25 years of experience. The annual academic load for the last 5 years (2018-2023) is 2707 hours. He teaches students in the Bachelor's and Master's Degree according to curricula developed and/or updated by him. He is a holder of 4 disciplines at the University of Applied Sciences "Bachelor" ("Microbiology" for the specialty "Agronomy, horticulture and viticulture", "Waste Management", for the specialty "Ecology and Environmental Protection", "Ecology of Microorganisms" for the specialty "Plant protection" and "Ecology and environmental protection", "Solid waste processing technologies" for special "Ecology and environmental protection"), and 5 disciplines in OCS "Master" ("Microbiology, in MC "Plant protection and MC "Plant medicine", "Waste management", "Municipal environmental programs" and "Circular economy and resource utilization" in MC "Ecology of settlement systems", "Microbial communities of OS components" in MC "Biodiversity Conservation".

Assoc. Prof. Shilev also gives lectures on Environmental microbiology and General microbiology with foreign students under the Erasmus Program.

Under the guidance of Assoc. prof. Dr. Shilev, 16 graduates (12 in the "Bachelor" and 4 in the "Master") and 2 doctoral students in the scientific specialty "Ecology and Ecosystem Protection", in the professional direction "Earth Sciences", have successfully defended their degrees.

He is the co-author of the Guide to Microbiology, which is aligned with the curriculum for conducting exercises in this discipline at AU- Plovdiv.

The materials presented by Associate Professor Dr. Stefan Shilev about the educational and pedagogical activity give grounds for concluding that they are in accordance with the accepted scientometric requirements for occupying the academic position of "professor" at AU-Plovdiv.

5. Significance of the obtained results, proven by citations, publications in prestigious journals, awards, membership in international and national scientific bodies, etc.;

An assessment of the candidate's recognition in scientific circles is the citations indicated in the competition documents. According to the reference submitted by the candidate, 620 citations were noticed. All this testifies to the interest of the scientific community in the developments and their results. These data give me reason to conclude that the applicant is a recognizable author in scientific circles who has published in significant scientific journals in the field of the competition.

Assoc. Prof. Dr. Stefan Shilev is a participant in national and international organizational and scientific committees of a number of scientific forums.

According to the minimum national requirements for holding the position of professor at AU-Plovdiv, the presented citations are completely sufficient and prove the very good level of reflection of the scientific production of Assoc. prof. Dr. Stefan Shilev in the research work of Bulgarian and foreign authors.

6. Significance of contributions to science and practice. A motivated answer to the question to what extent the candidate has a clearly defined profile of research work;

I accept the author's reference proposed by the candidate for the scientific and scientific-applied contributions.

The candidate's research work is in the field of ecology and ecosystem conservation and ecological biotechnology (use of beneficial bacteria in biotechnological approaches and their importance for soil and plant health).

The main scientific and scientific-applied contributions in the developments with the participation of Associate Professor Dr. Stefan Shilev are in 5 main directions, as follows:

1. Phytoremediation of soils contaminated with heavy metals with the participation of beneficial microorganisms.

The publications in the first direction are on problems related to the restoration of soils contaminated with heavy metals and metalloids. The studies were carried out at the University of Córdoba (Spain) and at AU - Plovdiv. The results of this direction have been published in 8 scientific publications, of which 3 are in journals with IF, 1 - in Springer (Scopus), 1 - in an edition referenced in Scopus, 1 - chapter of a monograph, 1 - chapter of a collective work. Part of the research is within the framework of scientific projects financed by 5 national and international projects. The important scientific and scientific-applied contributions in this regard are as follows: (1) A regression mathematical model was derived for the role of the bacterial population of the isolate *P. fluorescens* biotype F, the concentration of As in the soil and the accumulation of metalloid in the aerial parts of sunflower ; (2) Microbial transformations of elements in the rhizosphere have been found to be a key factor in their cycling, which may be the basis for a wide range of innovative biotechnological processes; (3) The combined application of organic ameliorants and beneficial bacterial populations has been shown to be a very useful approach to alleviate plant stress caused by heavy metals and can be successfully applied in various phytoremediation strategies; (4) *Saccharomyces cerevisiae* yeast strains tolerant to Cd

and As have been characterized, with potential for application in phytoremediation processes; (5) It has been established that the accumulation of heavy metals in agricultural crops poses a threat from their entry into the food chain.

1. Application of beneficial microorganisms to improve growth and yields in agricultural crops..

Research has been conducted related to clarifying the role of beneficial bacterial populations in mitigating the effect of abiotic stress on crops with special attention to water deficit and bacterial regulatory mechanisms in this direction. The results of this direction have been published in 8 scientific publications, of which 5 are in high IF journals and two of the publications are reviews. Research in this direction is funded by the National Institute of Scientific Research, the Academy of Sciences, the Ministry of Education and Science. The important scientific and scientific-applied contributions in this area are as follows: (1) The role of beneficial microorganisms for soil and plant health and mitigating plant stress as a result of increased salt concentrations and drought was investigated; (2) A significant reduction of Na⁺ accumulation in sunflower was found by inoculation with strains of *Pseudomonas* spp., the ability of *Candida melibiosica* 2491 to produce the enzyme phytase was studied; (3) The factors influencing the yield of microbial biomass and the metabolic activity of the inoculum, the characteristics of the final product, and strategies for their optimization; (4) The effect of organic, mineral and combined fertilization of potatoes on the yield and the development of the soil microbiome was investigated.

3. Utilization of biowaste through composting.

The obtained results in this direction have been published in 5 scientific publications, 2 of them are in journals with IF, and three of the publications are reviews. The studies are funded by doctoral programs, the Ministry of Education and Culture and state institutions. The more important contributions in this direction are as follows: (1) Complex study of the treatment of WWTP sludge by composting and vermicomposting; (2) Preparation of models for utilization of sludge from WWTP in agriculture, landscaping activities and for reclamation of disturbed terrains; (3) Bio-waste processing and product application in the context of EU circular economy policies. The developed technology for vermicomposting sludge from wastewater treatment plants has been applied in WWTP-Hisarya, WWTP-Sopot and WWTP-Karlovo, is an important applied contribution of the candidate.

4. Next-generation sequencing in studying soil and compost microbiome changes.

Research in this direction is funded by the NGO "Healthy Foods for a Strong Bioeconomy and Quality of Life" and the international project ConnectFarms through the Scientific Research Fund. Part of the results were published in two journal publications in

Q1 with an IF of 2.7. A publication in print is also prepared, also in a journal with IF.

The main contribution in this direction is the use of metagenomic analysis to study the changes in the compost microbiome during the different phases of composting and vermicomposting of agricultural waste. of sludge from sewage treatment plants.

5. Climate changes and environmental protection.

Part of the research in this direction has been financed under 2 international projects. 2 papers have been published, one of which is in a journal with an IF (0.507). The most important scientific and scientific-applied contributions in this regard are as follows: (1) An analysis of the air quality in the city of Plovdiv was carried out based on data from the Air Quality Management System; and (2) the possibilities of reusing reclaimed water in agriculture as part of the Strategic Goal "Green and Competitive Economy" in Bulgaria were investigated.

7. Critical notes and recommendations

I have no critical remarks about the candidate's works.

I have the following questions for the candidate:

1. Publication 15 investigated the accumulation of heavy metals in spinach plants and the role of beneficial bacteria and compost in mitigating the negative effect on the plants. One of the conclusions of the publication is that the introduction of beneficial bacteria contributes to improving the formation of plant biomass in conditions of abiotic stress. What do you think this effect is due to?

2. Publication 3 investigated the effect of introducing populations of two isolates on sunflower development. What accounts for the improved plant growth in isolate variants?

8. Personal impressions and opinion of the reviewer

I know Assoc. prof. Dr. Stefan Shilev personally. In my opinion, he is a built educator and researcher. It is characterized by professional competence, responsibility and creative activity.

CONCLUSION

Based on the analysis of the candidate's pedagogical, scientific and scientific-applied activities, I believe that Associate Professor Dr. Stefan Ivanov Shilev meets and exceeds the minimum National requirements for all groups of indicators for acquiring the academic position of "professor", has teaching experience, significant scientific production, well-known and appreciated by foreign and Bulgarian scientists and, in my opinion, meets fully meets the requirements of the Law of Development of the Academic Staff in Republic of Bulgaria, and the Regulations for the Implementation of the Law on the Development of the Academic staff in the Agricultural University.

All this gives me reason to positively evaluate his overall activity.

I take the liberty of proposing to the honorable Scientific Jury to also vote **POSITIVELY**, and the Faculty Council of the Faculty of Plant Protection and Agroecology at the Agricultural University - Plovdiv to elect Assoc. Dr. Stefan Ivanov Shilev as "**Professor**" in professional field 4. Natural Sciences, mathematics and informatics, professional direction 4.4., Scientific specialty "Ecology and Ecosystem protection".

Data: 7.11.2023

Plovdiv

Reviewer:.....

(Prof. Ph.D Eng. Violina Rizova)