

STATEMENT

by Assoc. Prof. Grigor Traykov Zehirov, PhD (Institute of Plant Physiology and Genetics - BAS) regarding the competition for the academic position of "Associate Professor" in the professional field 4.3. Biological Sciences (Plant Physiology - Symbiotic Relationships in Plants), for the needs of the Department of Plant Physiology, Faculty of Biology, announced in the State Gazette, issue 32 of 09.04.2024.

1. General Information on the Candidate's Career and Thematic Development.

In the current competition for the academic position of "Associate Professor" for the needs of the Department of Plant Physiology, Faculty of Biology, documents have been submitted by one candidate – Senior Assistant Marieta Georgieva Hristozkova. Until now, Senior Assistant Hristozkova has held the academic position of "Senior Assistant" in the same department.

After completing her higher education at the Faculty of Biology of Sofia University "St. Kliment Ohridski" in 2002, the candidate began scientific work at the Institute of Plant Physiology and Genetics - BAS as a "Biologic Specialist" (2002-2004). She became a regular doctoral student (2004-2007) in the "Mineral Nutrition" section of the same institute, and in 2007 she obtained a PhD in "Plant Physiology" with the code 01.06.16. During the period 2008-2018, she held the position of "Senior Assistant" at the "Plant-Soil Interactions" laboratory, Institute of Plant Physiology and Genetics - BAS. Since 2018, she has been appointed as a "Senior Assistant" at the Department of Plant Physiology, Faculty of Biology.

The CV shows that Senior Assistant Hristozkova has specialized abroad (Germany, France) to improve her skills in revealing the mechanisms of symbiotic relationships between legumes and nodule bacteria under different nutritional regimes. The themes of the projects presented by Dr. Hristozkova for participation in the competition are directly related to her priority scientific areas in plant physiology. Her achievements are correctly grouped into three main areas, namely:

1. Beneficial Plant-Microbial Interactions. This includes the interaction of plants with soil microflora (root nodule bacteria and mycorrhizal fungi);
2. Influence of Abiotic Stress Conditions on Plant Development. This covers the effects of salt stress and heavy metal contamination and the ability of plants to overcome them;
3. Revealing Methods for Improving Quality and Assessing the Antioxidant Activity of Medicinal and Aromatic Plants. This includes the study of antioxidant activity in in vitro propagated plants compared to those grown from seeds or wild-growing medicinal and aromatic plants.

Senior Assistant Hristozkova's project activities include participation in 7 scientific projects. The candidate has numerous participations in national and international conferences where she has presented her research for discussion.

Her scientific work is reflected in the publication of 34 scientific articles, 25 of which are indexed in Scopus or WoS. A Scopus check shows that she has 256 citations and an h-index of 9. The candidate has one participation in a review article in a book chapter.

2. Evaluation of Compliance with the Requirements for the Academic Position of "Associate Professor"

The information submitted by Senior Assistant Hristozkova meets the minimum requirements for the academic position of "Associate Professor" as set forth by the Law on Academic Staff Development in the Republic of Bulgaria (LASDRB), and the Regulations on the Terms and Conditions for Acquiring Academic Degrees and Holding Academic Positions at Sofia University "St. Kliment Ohridski." The points accumulated in each category, as listed in her author's report, have been correctly calculated and, in some cases, exceed the requirements. The total number of points across all scientometric indicators with which Senior Assistant Hristozkova is participating in the competition is 1130, distributed as follows:

- Group A (dissertation for awarding a PhD degree) – 50 points.
- The total number of points for Group B is 115 points (minimum 100 points) – including 5 publications (Q1 - 3, Q2 - 2).
- Group G includes 25 publications (Q1 - 1, Q2 - 3, Q3 - 7, Q4 – 0, 7 publications SJR without IF and 6 others), with a total of 303 points.
- Group D (citations) has 542 points, with a record of 298 citations in Scopus and 244 other citations.
- Group E – 120 points.

3. Analysis of the Main Directions in the Candidate's Research Work and the Relevance of the Research Topics and Their Most Important Results

The research topics forming the basis of Dr. Hristozkova's scientific work are divided into three main directions. The significant results from the conducted research are as follows:

Direction 1: Beneficial Plant-Microbial Interactions:

- Increased drought resistance of plants cohabiting with arbuscular mycorrhizal fungi has been established. Significant studies have been conducted on triple symbiosis among plants, nodule bacteria, and mycorrhizal fungi or plants, microalgae, and mycorrhizal fungi. The cohabitation of plants with nodule bacteria, and mycorrhizal fungi leads to enhanced growth parameters (biomass of above-ground parts and roots, number of fruits), content of plastid pigments, antioxidant activity, and less increase in oxidative markers under drought conditions. Coinoculation of basil (*Ocimum basilicum* L.) with arbuscular mycorrhizal fungi (AMF) and microalgae increases antioxidant potential, expressed as an increase in total phenols and flavonoids.
- Application of arbuscular mycorrhizal fungi increases biomass in *Solanum lycopersicum* L. grown under red-blue light. The use of mycorrhizal fungi together with synthetic fertilizers improves the yield and quality of lettuce.
- It has been proven that alfalfa is more sensitive than peas to Mo deficiency in nitrogen-fixing plants, resulting in reduced nitrogen-fixing activity and accumulation of stress-induced amino acids. The absence of micronutrients Mo and Cu in the growth medium of peas reduces the activity of enzymes involved in the initial stages of nitrate assimilation (nitrate reductase and glutamine synthetase), fresh weight, and plastid pigment content.
- 58 genes overexpressing under carbon and nitrogen starvation in nodule bacteria *Sinorhizobium meliloti* have been identified. Research on two mutants, *S. meliloti* NitR

and *S. meliloti* TspO, shows that in nutrient-limited conditions, the more resilient symbiotic system is alfalfa/*S. meliloti* TspO, while under Mo deficiency, inoculating alfalfa with *S. meliloti* NitR has a better effect on plant growth.

Direction 2: Influence of Abiotic Stress Conditions on Plant Development:

- Foliar application of spermine reduces the adverse effects of salinity on *Salvia officinalis*. Pretreatment with spermine reduces the effects of salinity, lowering concentrations of malondialdehyde, free proline, free thiol-containing compounds, and total phenols, while increasing the content of rosmarinic acid and carnosic acid.
- Sage (*Salvia officinalis* L.) grown in heavy metal-contaminated soil accumulates cadmium, lead, and zinc, inhibiting plant biomass, but the yield and quality of essential oil are not impaired, with the neutralization of H₂O₂ being a non-enzymatic rather than an enzymatic process.

Direction 3: Methods for Improving Quality and Assessing Antioxidant Activity of Medicinal and Aromatic Plants:

- Efforts in this direction focus on optimizing micropropagation conditions for Greek oregano (*Origanum heracleoticum* L.), garden thyme (*Thymus vulgaris* L.), and hyssop (*Hyssopus officinalis* L.), using biofertilizers and natural bioactivators to enhance the production of beneficial metabolites and characterizing the antioxidant potential of *Origanum heracleoticum* L. and wild-growing *Sideritis scardica* collected from various habitats in Bulgaria.

These topics are relevant and have significant implications for developing suitable agronomic practices to support the cultivation of crops in ever-changing climatic conditions. The persistent climate changes necessitate the creation of new agrochemical approaches to mitigate the harmful effects of the environment on crop yield and medicinal plants.

4. Organizational and Teaching Activities

The candidate has participated in the editorial boards of three international and one national journal, which is a testament to the high quality of her scientific work. The submitted documentation shows that Senior Assistant Hristozkova responsibly fulfils her teaching duties for undergraduate and master's degree students in the Department of Plant Physiology, Faculty of Biology. She leads three lecture courses and two student internships in the department, supervises 17 term papers and five student groups specializing in Molecular Biology, and has been the scientific advisor for three successfully defended diploma students.

5. Conclusion

Based on the materials presented for my review and the additional checks performed, I believe that Senior Assistant Marieta Hristozkova fully meets the regulatory requirements for the academic position of Associate Professor in the Faculty of Biology at Sofia University. The

results obtained so far provide a solid foundation for future research in the promising areas she is working on.

For the aforementioned reasons, I vote "Positive" for Senior Assistant Marieta Hristozkova to be awarded the academic position of Associate Professor in the professional field of 4.3. Biological Sciences (Plant Physiology – Symbiotic Relationships in Plants), for the needs of the Department of Plant Physiology, Faculty of Biology.

22.07.2024

Prepared by:

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