STATEMENT

on the competition for the academic position of **associate professor** in the field of higher education: 4. Natural sciences, mathematics, and informatics; professional direction: 4.3 Biological sciences, scientific specialty Plant Physiology, announced in the State Gazette No. 22 of 15.03.2024.

Candidate: Chief Assist. Prof. **Zornitsa Ivanova Katerova-Landzhova** PhD, Laboratory "Regulators of Plant Growth and Development" at the Institute of Plant Physiology and Genetics – BAS.

The opinion was prepared by: Prof. Dr. Malgozhata Yan Moetska-Berova, PhD, Agricultural University - Plovdiv, member of the scientific jury according to Order No. RD-01-25/13.05.2024 of the Director of IPPG – BAS.

General data on the candidate's career and thematic development

Zornitsa Ivanova Katerova-Landzhova graduated in Industrial Biotechnology at the Sofia University "St. Kliment Ohridski" - Sofia in 1999 and graduated with the degree of "Master in Biotechnological Processes". In 2002-2008, she was a PhD student at the Institute of Plant Physiology and Genetics - BAS. After successfully defending her PhD thesis entitled: "Physiological and biochemical changes in pea plants irradiated with UV-B and UV-C," she obtained a PhD in Plant Physiology. In 2009, she joined the Laboratory "Regulators of Plant Growth and Development" at the Institute of Plant Physiology and Genetics - BAS, where she continues her professional career.

Throughout her professional career, Katerova-Landzhova improved her qualifications through several specializations: Laboratory of Industrial Microbiology and Biocatalysis (Ghent University, Belgium), Laboratory of Plant Physiology and Biochemistry (University of Antwerp, Belgium), National Agriculture and Food Research Organization (Sapporo and Tsukuba, Japan). This allowed her to enrich her knowledge and to get acquainted with new methods and analytical tools in the field of plant physiology. Assist. Katerova-Landzhova is the technical editor of the scientific journal "Genetics and Plant Physiology". She speaks excellent English.

Fulfillment of the requirements for the academic position of "Associate Professor"

The scientific output of Dr. Katerova-Landzhova, including her doctoral thesis and publication activity, meets the requirements for scientometric indicators for the academic position of associate professor and corresponds to the profile of the announced competition.

Dr. Katerova-Landzhova's total publication activity includes 43 publications, 6 of which are included in her PhD thesis. Dr. Katerova-Landzhova has submitted 21 publications to the competition for associate professor, of which 18 with IF or SJR (Q1 - 3, Q2 - 7, Q3 - 7, Q4 - 1) and 3 book chapters without quartile. The total IF of the publications is 22.225. Dr. Katerova-Landzhova is the first or corresponding author of 12 publications. The information on fulfilling the minimum national requirements under Art. 2 "b" par. 1, 2, 3 and 5 of the Law on the Development of the Academic Staff in the Republic of Bulgaria for scientific field 4.

Natural sciences, mathematics and informatics; professional field 4.3. Biological sciences, from the chief assist. prof. Dr. Zornitsa Ivanova Katerova-Landzhova forms the following scientific indicators:

Group A - 50 pts; Group B – 0 pts (not required); Group C - 110 pts; Group D - 260 pts; Group E - 346 pts and Group F - 70 pts. With a minimum of 540 points for associate professor, according to Regulations on the Specific Conditions and Procedures for Acquiring Scientific Degrees and for Occupying Academic Positions at the IPPG-BAS, Dr. Katerova-Landzhova proves 836 pts, exceeding the minimum national requirements as well as the criteria according to the Rules for the Application of the Law on the Development of the Academic Staff of the Institute of Plant Physiology and Genetics - BAS.

Dr. Katerova-Landzhova's scientific achievements have been presented, besides publications, in oral reports (2) and poster presentations (20) at national and international forums. A total of 269 citations (refereed and indexed in Scopus) have been noted, and 173 of them (for the last 5 years) have been selected for participation in the current competition. The candidate has an *h* factor of 12 (according to Scopus).

Analysis of the main areas of the candidate's research activity

The research activity and achievements of Dr. Katerova-Landzhova are aimed at solving scientific and applied problems in the field of plant physiology, which can be formed in 2 directions:

I. I. The study of the physiological effect of ultraviolet irradiation (UV-B and UV-C) in cultivated plants and possibilities to overcome its negative effects by exogenously applied growth regulators (polyamine spermine; retardant MEIA, β-monomethyl ester of itaconic acid; natural substance Biomin containing humic acids; auxin-like compounds TA-12 and TA-14) - publications B4-1 to B4-6, G7-1 to G7-4, G8-1.

- For the first time, the effect of daily irradiation of pea plants with low-intensity UV-C over a prolonged period (21 days) was followed. It has been shown that UV-C leads to a rise in hydrogen peroxide levels, which, in combination with a decreased malondialdehyde content, proves the possibility of activation of defense mechanisms in the studied plants protecting against lipid peroxidation, regardless of the age of the studied leaf. In young leaves, the increased content of free proline is probably related to its protective role as a biomembrane protector. The importance of macromolecule-associated endogenous polyamines as a protective response to stabilize biomembranes after low-intensity UV-C irradiation has also been demonstrated, regardless of the age of the leaf stage (B4-6, G7-1).
- DNA disruptions, including double-strand breaks (DSBs), were detected by neutral comet assay when high-dose UV-C radiation was applied to isolated nuclei from monocot and dicot plants with different genome sizes (wheat > barley > pea). The lower levels of DNA DSBs in wheat compared to barley and peas support the hypothesis that plant species with larger genomes may have better tolerance for UV-C irradiation (B4-2).
- The pre-applied polyamine spermine was found to reduce the negative effects of high-dose UV-C irradiation of pea shoots by stabilizing cell membranes and activating non-enzymatic antioxidants. Pretreatment with the growth regulator also helps maintain normal plant growth (B4-5).

- The protective effect of preventively applied retardant MEIA on young wheat plants irradiated with high dose UV-C was demonstrated by lower levels of stress markers and higher levels of thiol-containing antioxidants compared to irradiated plants (G7-2). A similar protective effect of pretreatment with MEIA was found in UV-B irradiation of tomato plants cv. Ailsa Craig (ACr, wild-type) and it's mutant ah (anthocyaninless of Hoffmanns) - (B4-4).
- Foliar pretreatment with the auxin analogs TA-12 and TA-14 protected pea plants from the effects of UV-B irradiation, which was demonstrated by enhancing non-enzymatic and stabilizing or enhancing enzymatic antioxidant activities (G7-4).

II. Study the physiological effect of other abiotic stresses (drought, herbicides) in economically valuable crops and possibilities for overcoming their negative effects through applying growth regulators (publications G7-5 to G7-12, G8-2 and G8-3).

- For the first time, an integrated study of the physiological response of wheat (cultivar Sadovo-1) and triticale (cultivar Rozhen) to combined treatment with the selective herbicide Serrate (Syngenta) and water stress was conducted. It was found that depending on the tolerance of wheat and triticale to the two types of abiotic stress, typical phenotypic changes and damage at the biochemical level were observed. In combination with drought, the herbicide further increased the accumulation of reactive oxygen species, which enhanced the damage and increased the enzymatic activity of antioxidant and xenobiotic-detoxifying enzymes in triticale plants. In comparison, in wheat, herbicide treatment followed by soil drying for 7 days did not further damage it and plants recovered successfully after returning to normal irrigation regime (G7-5 to G7-10).
- The modulating effect of the brassinosteroid (24-epibrassinolide – EBL) in glyphosate-treated wheat was established. Pretreatment with EBL before total herbicide use on young plants partially restored shoot growth and showed the potential to reduce generated oxidative damage by activation of the enzymatic antioxidants and total phenols (G7-12).

I accept the author's reference prepared by Dr. Katerova-Landzhova for her scientific contributions and the manner of their presentation. Some of them are original and others are affirmative. The new scientific facts obtained by studying the response of plants through changes in the levels of stress markers, oxidative stress-related antioxidants (enzymatic and non-enzymatic) and phytohormones broaden the view of the physiological effects of UV (UV-B and UV-C) irradiation on plants. The obtained scientific facts reflected in the publications of Dr. Katerova-Landzhova show the role and importance of the application of growth regulators with different chemical nature and mechanisms of physiological action as potential agents with protective effects against various environmental stressors such as UV irradiation, herbicide, and water stress.

In the attached reference for the scientific contributions is noted what is the personal contribution of asst. Katerova-Landzhova in publications. It is expressed in the derivation of the experiments, interpretation of the obtained results and layout of the publications.

Organisational and training activities

Dr. Katerova-Landzhova has participated in the development of 13 scientific research projects (member of the scientific team); in 1 project, she was a member of the target group; in 4 projects - she was a scholarship holder. There are no data on students in training.

Critical comments and recommendations

I have no comments or recommendations for the candidate.

Conclusion

Based on the analysis of the scientific and scientific-applied activity, I consider that the candidate, Chief Associate Professor Zornitsa Ivanova Katerova-Landzhova, Ph.D., meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations on the Specific Conditions and Procedures for Holding Academic Positions at the IPPG–BAS. From the presented reference, it is evident that she is an established specialist in the field of plant physiology, with a clear scientific profile and achieved original and applied contributions.

This gives me a reason to evaluate her overall activity **POSITIVELY**.

I would suggest to the Scientific Jury to also vote positively, and the Scientific Council of IPPG-BAS to choose the candidate Zornitsa Ivanova Katerova-Landzhova as an associate professor in the scientific specialty Plant Physiology.

Date: 11.06.2024 Prepared by: .....

Plovdiv (Prof. Dr. Malgozhata Berova)