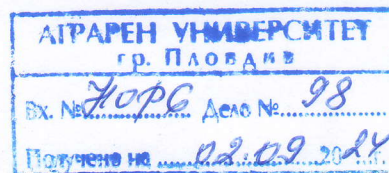


REVIEW



regarding a competition for the academic position of "Associate Professor" in the field of higher education 6. Agricultural sciences and veterinary medicine; professional direction 6.1. Plant Growing; scientific specialty Plant Biochemistry, announced in SG No. 36 of 23.04.2024.

Candidate: Ch. Assistant Professor, PhD, Adelina Slavova Harizanova from the Department of Plant Physiology, Biochemistry and Genetics at the Agricultural University of Plovdiv (AUP)

Reviewer: Prof. Andon Vassilev Andonov, PhD, Agricultural University of Plovdiv (AUP), higher education area 4. Natural sciences, mathematics and informatics; professional direction 4.3. Biological Sciences; scientific specialty Plant Physiology, determined by Order of the Rector of AUP No. RD-16-807 / 18.06.2024.

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

Adelina Harizanova graduated from the Agricultural University - Plovdiv (AUP) with a bachelor's and master's degree in Plant Protection in 2005 and 2006, respectively. He began his working career as a consultant and manager of an agricultural pharmacy, whose activity continues to this day. In the period 2009-2010, he worked as a junior specialist in the National Plant Protection Service (now Bulgarian Food Safety Agency).

During the period 2013 - 2017, she was a full-time doctoral student in the Department of Plant Physiology and Biochemistry at the Agricultural University - Plovdiv, where she successfully defended her dissertation on the topic: "Study on the physiological effect of silicon (Si) in hydroponic cultivation of cucumber (*Cucumis sativus* L)". In 2017, Dr. Adelina Harizanova was elected as an assistant and since 2018, she has worked as Chief Assistant in Plant Biochemistry in the same department.

Along with his teaching activity, Ch. Assistant Professor Harizanova conducts research that is focused on a number of applied aspects of Plant Biochemistry. In general, she studies functional changes and disorders in agricultural plants under the influence of (1) abiotic and biotic stressors and (2) effects of biostimulants, foliar fertilizers and plant protection products on plant tolerance to stressors, their productivity and the quality of crop production.

Ch. Assistant Harizanova speaks several foreign languages (excellent English and German and good Russian), which has a positive impact on her career growth as a scientist and teacher. She actively participates in various activities under the Erasmus+ program as coordinator of the Faculty of Agronomy (2020-2024, 2024-current), lecturer in Biochemistry of incoming foreign students (2017-2024), lecturer at partner universities (University of Mansoura, Egypt, 2018-2019), member of the team of an international project for building personnel capacity in the field of plant protection (2019-2023), etc. From 2018 until now, she is a member of the Editorial Board of the authoritative scientific journal - *Journal of Central European Agriculture*.

Ch. Assistant Harizanova has high competence in the field of modern information and communication technologies [Microsoft Office (Word, Excel, and PowerPoint), Adobe Photoshop, Paint, Acrobat 6.0 Professional, and SPSS] and uses them actively in her teaching and scientific activities.

2. General description of the presented materials

The candidate Ch. Assistant Dr. Adelina Harizanova participated in the competition with 35 works, which are beyond those presented during the defense of the dissertation work for the acquisition of the degree "Doctor". The works include 34 scientific publications and 1 book based on a defended dissertation.

In addition to the scientific works, the candidate has submitted all the necessary references and information required by the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) and the Regulations for the Implementation of the LDASRB in AUP.

The scientific works with which Ch. Assistant Adelina Harizanova participated in the competition, are distributed as follows:

- (●) 22 issues in journals referenced and indexed in global databases;
- (●) 12 issues in non-refereed peer-reviewed journals or published in edited collective volumes;
- (●) 1 book based on a protected dissertation work.

Five of the candidate's scientific works have an impact rank (IR) and 3 of them impact factor (IF) as well, which corresponds to the specific requirements of the Regulations for the implementation of LDASRB in the AUP (item 11 of the Appendix to Art. 1a, paragraph 1) at least 2 of the presented scientific works must have IF or IR. These works, according to the numbering in the Individual report for the fulfillment of the minimum national requirements, are No. 2, 3, 16, 19 and 21. Their distribution by quartiles is as follows: Q1–1 issue (No. 16), Q2–1 issue (No. 2), Q3–1 issue (No 3) and Q4–2 issues (No 19 and 21). The candidate is an independent author in 2 of the papers, leading in 12 and second in 17, which is evidence of a high personal contribution in conducting the experiments and preparing the publications.

To assess the conformity of the scientific production of Ch. Assistant Harizanova with the minimum national requirements for occupying the academic activity "Associate Professor" according to the Regulations for the Implementation of LDASRB, I have presented data for individual groups of indicators in the attached table.

Groups	Indicators	Points	
		Requirement	Fulfilment
A	Doctoral dissertation	50	50
B		100	146
B4	Habilitation work (papers, referred and indexed in global databases with scientific information)	(min 10 issues)	(2x20=40) (6x15=90) (1x10=10) (1x6=6)
G		200	302,83
G6	Published book on the basis of a defended dissertation for the award of the educational and scientific degree "Doctor"		(1x40=40)
G7	Articles and reports published in scientific journals, referenced and indexed in global databases with scientific information		(9x15=135) (1x7.5=7.5)
G8	Articles and reports published in non-refereed peer-reviewed journals or published in edited collective volumes		(9x5=45) (1x3,33=3.33) (1x2=2) (1x2,5=2,5)

G9	Reviews published in scientific journals, referenced and indexed in global databases with scientific information		(1x45=45) (1x22,5=22,5)
D		50	120
D13	Citations or reviews in scientific publications referenced and indexed in global databases with scientific information or in monographs and collective volumes		(8x15=120)
Total		400	618,83

Based on the data indicated in the table, I believe that the scientific production, with which Ch. Assistant Dr. Adelina Harizanova participated in the competition, is in accordance with the minimum national requirements for occupying the academic activity "Associate Professor". At the same time, it is necessary to note that there is an excess over the minimum requirements of 218.83 points, which is formed by the higher number of points of the candidate in groups of indicators B, G and D.

According to the above-mentioned specific requirements in the Regulations for the implementation of LDASRB in AUP, the candidates for the academic position "Associate Professor" must submit at least 2 citations in scientific journals holding IF or IR. In the specific case, the submitted citations that meet the condition are 8. Fifty points for indicator E (18/19) can be added to the candidate's indicated points for participation in research projects, although these are not required for this academic position. Ch. Assistant Harizanova took part in 2 national and 1 international research project.

3. Main directions in the candidate's research work

The studies presented in the scientific publications, with which Ch. Assistant Dr. Adelina Harizanova participated in the current competition, can mainly be attributed to 3 groups, namely:

- 1) influence of Si-containing products on the physiological-biochemical status of plants in conditions of abiotic and biotic stress;
- 2) influence of biostimulants, foliar fertilizers and plant protection products on the tolerance of plants to stress factors, their productivity and quality.
- 3) biochemical aspects of interactions between pathogens, plants and pesticides.

The studies of the **first group** represent a continuation and expansion of the candidate's research on the problem developed in his dissertation thesis on the effects of Si-containing products on plants. Specifically, the studies were carried out with young cucumber (*Cucumis sativus* L.) and zucchini (*Cucurbita pepo* L.) plants subjected to salinity or infected with the common spider mite (*Tetranychus urticae* Koch.). The effects of two types of Si-containing products - orthosilicic acid (H_4SiO_4 , foliar treatment) and sodium silicate (Na_2SiO_3 , included in the nutrient solution) on a number of biochemical, physiological, anatomical-morphological and other parameters of plants were tested, as well as on some indicators reflecting the development of the mite. The main part of the obtained results are reflected in 8 experimental articles - No. 4, 5, 12, 21, 22, 25, 26 and 34. As a positive fact, I can note that the candidate popularized the results of his dissertation thesis in the author's book "Silicon and stress in plants" (ISBN 978-954-517-332-5; paper No. 12) and summarized the information on the current state of the problem in his review study "Silicon application

unveiled: A review of insights into plant defense mechanisms under biotic challenges " (paper No. 35).

Research for the **second group** is related to the study of the influence of various biostimulators (protein hydrolysates, algae suspensions, combined products) on the stress tolerance of plants (low temperatures, oil pollution), as well as on their productivity and quality. The effects of the mentioned products on the activity of antioxidant enzymes and enzymes related to nitrogen assimilation, photosynthetic indicators, structural parameters of productivity, chemical composition of crop production, etc. were studied. Results are presented in publications No 2, 3, 7, 8, 9, 10, 11 and 33. The effects of fungicides (Papers No. 13, 14), herbicides (No. 15), adjuvants (No. 17) and biologicals (No. 18) on the content of mycotoxins, the chemical composition of the production, the productivity of crops, etc. were also investigated.

The **third group** refers to publications that contain information on physiological-biochemical damages to plants by various types of pests, as well as on the biological mechanisms of action of some groups of plant protection preparations. More specifically, the functional damages inflicted by the following groups of pests are examined: leaf fleas on fruit species (No. 27), flat thyroid aphids on fruit, shrub and tree ornamental species (No. 29), cicadas on fruit, berry and vine plantations (No. 30) and various types of mites on the vine (No. 31). An overview was made on the mechanisms of action of various categories of chemical products with zoocidal action, such as organophosphorus insecticides and acaricides, synthetic pyrethroids, bacterial preparations, viral products and other active substances (No. 23, 24).

After a detailed acquaintance with the works with which Ch. Assistant Dr. Adelina Harizanova participates in the competition, I accept that they correspond to his scientific specialty, namely Plant Biochemistry in professional direction 6.1. Plant Growing. The scientific papers (without No. 12 and 35) are published in co-authorship, but allow the biochemical aspects to be highlighted from the more general plant growing context of the scientific research carried out.

4. Significance of the obtained results, proven by publications in prestigious journals, citations, awards, etc.

The main part of the research of Ch. Assistant Dr. Adelina Harizanova have been published in scientific journals, referenced and indexed in Web of Science and Scopus, including in journals with IF and IR. The results of her research have been presented at national and international conferences. Specifically, the candidate has participated in such forums with 3 oral presentations and 16 poster presentations. The studies of Ch. Assistant Harizanova have found a feedback from the international scientific community. The Scopus international database reference shows that 6 of her publications have been cited 31 times in authoritative scientific journals such as Plant Physiology and Biochemistry, Biomolecules, International Journal of Molecular Science, Agronomy, etc.

5. Significance of contributions to science and practice

As a result of the research conducted by Ch. Assistant Adelina Harizanova, original and confirmatory contributions, the main part of which have a scientific and applied nature, have been received. I accept the author's reference to the essence of the contributions, but I believe that they could be presented in an even more synthesized form. I will point out the

more important contributions, which, in my opinion, give the clearest idea of the candidate's scientific achievements.

(●) Contributions related to studies on the effects of Si-containing products on plants

- 1) For the first time in Bulgaria, a systematic study was conducted on the role of Si-containing products for the tolerance of agricultural plants to abiotic (salinization) and biotic (mite) stress.
- 2) The scientific information about the nature of the positive influence of Si-containing products on the physiology-biochemical status of cucumber plants subjected to salinization has been enriched. It was established that it is due to an improvement in the oxidation-reduction capacity of salted plants, an indicator of which is the reduced degree of lipid peroxidation, increased antiradical and antioxidant activity, which in turn lead to better protection of the photosynthetic apparatus of plants from salt stress.
- 3) The scientific information about the positive influence of Si-containing products on the physiology-biochemical status of zucchini and cucumber plants infected with common spider mite has been enriched. It has been shown to be related to the improved antioxidant defense system of plants, indicated by the increased activity of the enzymes guaiacol peroxidase and phenylalanine ammonia-lyase and the increased content of salicylic acid, which together lead to better storage of photosynthetic pigments and improvement of leaf gas exchange of infected plants.

(●) Contributions related to studies on the effect of biostimulants, foliar fertilizers and plant protection products on plants

- 4) The effectiveness of pre-treatment of plants with biostimulators (priming) on their tolerance to stress factors has been confirmed. In particular, preventive foliar treatment of cucumber plants with the protein hydrolysate Naturamin WSP was found to increase their tolerance to low temperature stress. Indicators of the positive impact are the increased content of free proline, the reduced degree of lipid peroxidation and the increased activity of the enzyme guaiacol peroxidase in plant organs.
- 5) The possibility of using microalgae for bioremediation of contaminated soils has been confirmed. Specifically, the application of a microalgal suspension has been shown to improve the physiological status of barley plants grown on petroleum-contaminated soil. Indicators of the positive influence of microalgae are the decreased degree of lipid peroxidation and the increased values of the rate of photosynthesis, the content of photosynthetic pigments and the quantum yield of Photosystem 2 in the treated plants compared to the untreated controls.
- 6) The information on the positive effect of foliar products (biostimulators and foliar fertilizers) on physiological-biochemical processes in plants, their productivity and quality has been enriched. In particular, a stimulating effect of the foliar products Tecamin Max, Amino Bore, Plantafol and Fertigreen Foliar on nitrogen assimilation was found, which was demonstrated by the increased activity of the

enzymes nitrogenase, nitrate reductase, glutamine synthetase and asparagine synthetase in alfalfa plants.

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

Ch. Assistant Dr. Adelina Harizanova has a total of 18 years of work experience, of which 7 as a teacher. The teaching activity includes conducting practicals and seminars in Biochemistry and related disciplines (Enzymology, etc.) and guiding Bulgarian and foreign graduates.

The total auditorium occupancy of Ch. Assistant Harizanova with students in both "Bachelor" and "Master" level in the period 2018 - 2023 is 2548 hours. On average, she completed 424 hours per year, which corresponds to the required standard for educational activity. This amount of hours also includes 126 hours of lectures on Plant Biochemistry, which she delivered after being assigned by the Faculty Senate of the Faculty of Agronomy. Additionally, Ch. Assistant Harizanova conducted 150 hours of practicals in Biochemistry, in English, with incoming Erasmus+ students. During the mentioned period, she supervised 2 graduates in Bachelor level and 3 graduates in Masters level, who successfully defended their diploma theses.

7. Critical notes and recommendations

I have no critical remarks, but I have 2 recommendations for the candidate.

- 1) To enrich his teaching activity by developing and including new methodical units in the practicals in Plant Biochemistry.
- 2) To summarize his knowledge of the biochemical aspects of the interactions between pathogens, plants and pesticides in a textbook, which will be of help to the students in the "Master" level.

8. Personal impressions and opinion of the reviewer

I have known Adelina Harizanova as a PhD student in the Department, and later as a teacher. I believe that she has a high professional training in Biochemistry and Plant Physiology and considerable knowledge in the field of plant protection. These prerequisites, together with her inherent diligence, curiosity and tenacity, give me reason to believe that she is a promising scientist with potential for development in the field of applied Plant Biology.

CONCLUSION

The documents and scientific production presented by Ch. Assistant Dr Adelina Slavova Harizanova in the competition, meet the requirements of LDASRB and the Regulations for its application in AUP.

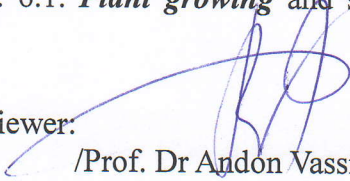
Ch. Assistant Harizanova has a clearly defined scientific profile in the field of applied Plant Biochemistry. She has presented a sufficient number of scientific papers published in authoritative scientific journals. The works contain scientific and applied contributions that are of interest to agricultural science and practice. Her scientific indicators exceed the minimum national requirements for occupying the academic position "Associate Professor".

Ch. Assistant Harizanova conducts active educational activities with Bulgarian and foreign students in Biochemistry and related disciplines, as well as public work as a faculty Erasmus+ coordinator, editor, etc.

After thorough acquainting with the materials and scientific works presented in the competition and analysis of the obtained results and scientific and applied contributions, I am fully convinced to give my **POSITIVE** evaluation and recommend the Scientific Jury to prepare a report-proposal to the Faculty Council of the Faculty of Agronomy at AUP for the selection of **Ch. Assistant Professor Dr. Adelina Slavova Harizanova** in the academic position "*Associate Professor*" in professional direction: 6.1. *Plant growing* and scientific specialty: *Plant Biochemistry*.

18.08.2024

Reviewer:


/Prof. Dr Andon Vassilev/