

REVIEW

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on a competition for the academic position of "associate professor" in the field of higher education 5. Technical Sciences, professional field 5.11. Biotechnology, scientific specialty "Technology of biologically active substances (incl. enzymes, hormones, proteins)", was announced in the Government Newspaper No. 70 of 20.08.2024, for the needs of the Department of "Biotechnology" at the Faculty of Technical Sciences, University "Prof. Dr. Assen Zlatarov" with candidate: Assistant Professor, Dr. Eng. Galina Dimitrova Yordanova
Reviewer: prof. Dr. Nastya Vasileva Ivanova,
Technical University - Sofia, College - Sliven

1. General information and biographical data:

The current competition for an "associate professor" academic position is announced for the needs of the Department of Biotechnology at the University "Prof. Dr. Assen Zlatarov", published in the Government Newspaper No. 70 of 20.08.2024. The only candidate in the competition is Dr. Eng. Galina Dimitrova Yordanova, Assistant Professor at the Department of Biotechnology. Galina Yordanova graduated with a "Master" degree in the year 2000, Master's program "Biotechnology" at the University "Prof. Dr. Assen Zlatarov" - Burgas. In 2006, she began her studies in the doctoral program "Technology of biologically active substances (incl. enzymes, hormones, proteins)" at the University "Prof. Dr. Assen Zlatarov" - Burgas. At the same time, in the period 2006 - 2007, she was a part-time assistant at the same university. From 2007 to 2014, she was appointed as an assistant in the Department of Biotechnology full time, and in 2013 she acquired the scientific and educational degree "doctor" in the scientific specialty 02.11.11 "Technology of biologically active substances" at the University "Prof. Dr. Assen Zlatarov" - Burgas, Department of "Biotechnology" The topic of the dissertation is " Biodegradation of phenol and phenol derivatives with immobilized microbial cells". The academic position "Assistant Professor" in Professional Direction: 4.3. "Biological Sciences" was received in 2016, which she holds until now. In total, Dr. Yordanova's work experience at this university is 18 years. The scientific and career development of Assistant, Dr. Galina Yordanova began in the field of biotechnology, then she moved to direction 4.3. Biological Sciences, and in this competition, she applied again in Professional Direction 5.11. Biotechnologies.

2. General description of the materials presented

The research and applied science activities of Assistant Professor Dr. Galina Yordanova are represented by:

- 1 monographic work "B.3", published in 2022 - accessible through the free catalog COBISS.BG. The monograph is entitled "Methods for improving quality in organizations in the chemical and biotechnology industry". It has a volume of 224 typewritten pages and is co-authored with Assoc. Prof. Dr. Dobromir Yordanov. There is a Declaration from the co-author - Assoc. Prof. Dr. Dobromir Ivanov Yordanov, that Assist. Prof. Dr. Galina Yordanova has 70% participation in the monographic work.

On this indicator, the candidate has 100 points out of 100, which are required according to the minimum criteria, according to the Law of Higher Education and Research of the Republic of Bulgaria for the academic position of "associate professor";

- 28 publications under indicator "G", of which:
 - 7 are in refereed and indexed publications in world-renowned Web databases of Science and Scopus (indicator "D.7");
 - 21 are in non-refereed but peer-reviewed publications (indicator "D.8").

In 14 of the publications, Dr. Yordanova is in first place, in 10 she is in second place, in 2 she is in third place and in two she is in fourth and fifth place. All publications are on the issues of the competition.

From the listed above, it is clear that the candidate has made a significant contribution to the development of her scientific articles. All of them deal with issues in the field of Biotechnology.

The total number of points under indicator "D" is 309.03 out of 200, which are required according to the minimum criteria according to the Law on the State Academic Affairs of the Republic of Bulgaria for the academic position "associate professor" and 300, required according to the Regulations on the conditions for acquiring scientific degrees and occupying academic positions at the University "Prof. Dr. Assen Zlatarov" - Burgas;

- 15 citations by indicator "D", which are in publications placed in journals, referenced and indexed in world-renowned databases Scopus and Web of Science.

According to this indicator, Assistant Professor Dr. Yordanova has 150 points out of 50 (required according to the Law on Academic Staff of the Republic of Bulgaria) and 100, which are required according to the Regulations on the conditions for acquiring scientific degrees and holding academic positions at the University "Prof. Dr. Assen Zlatarov" - Burgas;

- For indicator "E", according to the Regulations on the conditions for acquiring scientific degrees and holding academic positions at the University "Prof. Dr. Assen Zlatarov" - Burgas, 100 points are required. They are formed on the basis of the submitted references, as follows:

- certificate of participation in a project under the OP "Innovation and Competitiveness" contract No. BG 16RFOP002-1.005-0031 "Development of an innovative product - imaging cytometer" Hand-held";
- certificate of participation in project No. BG05M2OP001-2.02-0001 "Student practice" - Phase I, called "Project in a real working environment for acquiring professional skills" and co-financed by the EU for the period 2016 - 2018;
- certificate of participation in project No. BG05M2OP001-2.013-0001 "Student Practice" - Phase II, implemented with the support of the OP "Science and Education for Smart Growth", co-financed by the EU, in implementation of additional agreement No. 141-5/21.05.2020 for the period 2020 - 2023;
- 1 published application for invention "Solid fuel based on household and industrial waste, method for its production and use", with authors: Dobromir Yordanov, Zlatovsvet Tsonev, Mustafa Zilya, Galina Yordanova, the application was published in issue 5/31.05.2016 in the Official Monthly Edition of the Patent Office, Sofia, 2016;
- 1 book (notes) with the title "Food Legislation and Food Policy", ISBN 978-619-273-033-8, UDC 614.31, available through the free catalog COBISS.BG-ID 67163144;
- list of participation in 14 scientific intra-university projects, of which he is a project manager in 2. The topics of the two projects are as follows: "Investigation of the

possibilities of coffee grounds for obtaining bioproducts" - No. NIH-459/2021;
"Investigation of the viability and activity of baker's yeast" - No. NIH-417/2018;

According to indicator group E, the candidate has the following points:

- E 18 "Participation in a national scientific or educational project" – 30 points;
- E 23 "Published university textbook or textbook used in the school network – 40 points;
- E 25 "Published patent or utility model application" (invention) – 20 points.

The total number of points for indicator group E is 90 out of the required 100, according to the Regulations on the conditions for acquiring scientific degrees and holding academic positions at the University "Prof. Dr. Assen Zlatarov" - Burgas.

I would like to note that the Law on Higher Education and Research of the Republic of Bulgaria for the academic position of "associated professor" does not set any requirements for this group (E) of indicators. Such a requirement does not exist in the National Academy of Sciences and Arts of the Republic of Bulgaria either.

Dr. Yordanova has not submitted the Abstract of her dissertation and the publications to it, but upon my request, I received a list of scientific publications. I note that the articles submitted in this competition are not repeated. I have not identified any plagiarism in the submitted materials.

The submitted documents and materials fully comply with the requirements of the of the RSARB Law on Academic Staff of the Republic of Bulgaria for the academic position of "associated professor" and the Regulations on the conditions for acquiring scientific degrees and holding academic positions at the University "Prof. Dr. Assen Zlatarov" - Burgas.

Assistant Professor Dr. Galina Yordanova exceeds the minimum requirements of the Law on the Bulgarian Academy of Sciences and Arts for the academic position of "associate professor" - with a required total number of points - 400, she has achieved 699.03 points. In addition, she also exceeds the minimum requirements of the Regulations on the conditions for acquiring scientific degrees and holding occupying academic positions at the University "Prof. Dr. Assen Zlatarov" - Burgas, according to which 650 points are required.

3. General characteristics of scientific research and applied science activities.

The scientific research and applied research activities of Assistant Professor Dr. Galina Yordanova are in the professional field of "Biotechnology" and the scientific specialty "Technology of biologically active substances (incl. enzymes, hormones, proteins)". This is a very relevant topic worldwide. The presented scientific works are in Bulgarian and foreign scientific journals, and are in accordance with the national and university regulatory framework for acquiring scientific degrees and holding academic positions:

- 18 of the publications are presented in English;
- 10 of the publications are presented in Bulgarian.

The candidate's presented scientific works are as follows:

➤ monograph – 1. It presents methods for improving quality in industrial enterprises of the chemical and biotechnology industries, which include procedures and algorithms for various processes in organizations. Issues are considered for: improving quality and decision-making at the organizational and laboratory levels; developing and implementing procedures for incoming control of raw materials and materials in enterprises of the chemical and biotechnology industries; procedures and algorithms for internal and external quality control in testing and medical laboratories; developing a procedure for incoming control of raw materials and materials; for

process research and elimination of non-conformities; as well as for outgoing control of finished products in organizations, etc.;

➤ book (textbook - notes) - 1, which is entitled "Food Legislation and Food Policy". The notes are intended for students of the specialty "Food, Nutrition, Dietetics " for the educational qualification degree "Master" at the University "Prof. Dr. Assen Zlatarov" - Burgas and are consistent with both the curriculum of the specific discipline and other studied disciplines in the specialties. The notes can also be used by students of other specialties and professional fields.

As a practice guide, it is structured in 11 chapters with a distinct scientific and applied focus. Up to chapter 7, the documents from the EU and Bulgarian food legislation in the field of food are examined. From chapter 8 until the end, the food regulations in Bulgaria and the measures that the country is taking to improve it are summarized;

➤ In the 28 scientific publications presented, several directions are outlined:

1. Biodegradation of phenol and phenol derivatives with immobilized microbial cells on various carriers:

- Covalent bonding was performed immobilization of *Trichosporon cutaneum* R57 cells on polyamide - PA and polyacrylonitrile - PAN membranes with glutaraldehyde as a crosslinking agent (G7-1);

- Covalent bonding was performed *Aspergillus* immobilization *awamori* NRRL 3112 on a modified polyacrylonitrile membrane. Phenol biodegradation experiments were also carried out in a spiral-wound membrane bioreactor with an immobilized *Aspergillus* strain *awamori* NRRL 3112 in recirculation mode (G7-2);

- immobilized systems of *Aspergillus* were also obtained *awamori* NRRL3112 and *Trichosporon cutaneum* R57 on modified polyamide granules. The rate of biodegradation of phenol and some phenol derivatives was determined. The advantages of the two combined immobilized systems for biodegradation of phenol and phenol derivatives were proven in comparison with the separate immobilized systems of the two strains and free cells (G7-3);

2. Quality control and management in various food production and laboratories;

- Corrective actions have been developed in a laboratory for testing milk and dairy products, which provide an algorithm for identifying and assessing the calibration range of a technical device "densitometer" for milk and dairy products. (D8-1);

- An algorithm for analyzing the causes of a decline in production has been developed and applied to a company producing meat and meat products. Corrective actions appropriate to the specific operation and strengthening control at all levels have been proposed (G8-2);

- A study was conducted to improve the methodology and increase the competitiveness of a beer production company, which can help other companies fight competitors on the path to excellence in work (G8-4);

- A procedure is proposed for compiling an uncertainty budget for the initial verification of a standardized test method or validation of an interlaboratory method, by using two certified reference materials at the lower and upper limits of the measurement range of the respective method (G8-7);

- In connection with the requirements of BDS EN ISO/17025 and BAS QR 18 to ensure the authenticity of the results, tests were performed to detect *Salmonella* species (G8-8);

- A new solution for inbound control of raw material supplies for a dairy processing company, linked to a decision-making module, has been studied. The new module helps clarify forecasts for compliance with the requirements for the supply of raw materials for dairy production (G8-20);

- A new method for predicting the controllability of the measurement process in a microbiology laboratory is presented using a control chart of cumulative sums for the En criterion and the stepwise approximation method (G8-21);

3. Yeast – vitality and viability:

- *Saccharomyces cerevisiae* yeast was studied, which was compared by a standard method and by a fluorescence counter produced by different manufacturers. The lifting force of baker's yeast at different concentrations and different dough fermentation temperatures was measured and compared (D8-9);

- image-based cytometric method for determining the total number and viability of yeast cells using a newly synthesized DNA fluorescent dye is presented. The proposed method can be used in assays involving simple cell counting and quality assurance in bioprocessing of samples (G7-4);

- baker's yeast *Saccharomyces cerevisiae* was studied frozen at -20 °C and thawed at room temperature. As a result of prolonged freezing and thawing, a decrease in the vitality and viability of the baker's yeast was observed (G8-10);

4. Application of molds and yeasts to obtain valuable bioproducts:

- biofuels from different types of biomass is presented, a comparison of the different processes used for biomass pretreatment and their impact on biofuel yields (G8-11);

- The possibilities for growing and developing two types of *Aspergillus oryzae* microorganisms have been investigated and *Saccharomyces cerevisiae* on coffee grounds, with the aim of utilizing coffee waste:

- As the concentration of the sediment increases, cell growth also increases, which is indicative of continuing research to obtain organic bioproducts (G8-12);

- The fermentation of coffee grounds obtained from a vending machine in the presence of an *Aspergillus oryzae* strain was studied. It has been shown that the most thermodynamically stable process is 24 hours at 30 °C (G8-13);

- When analyzing coffee grounds, it has been shown that they can be successfully used as part of the growth medium of the *Aspergillus oryzae* species and even alone as a medium. No significant difference was found between the activity of the enzyme on the two types of media (G7-5);

- Coffee grounds and the ability of *Aspergillus oryzae* were studied to grow and absorb it as the sole carbon source, producing bioethanol. The results show that as the concentration of coffee grounds increases, the amount of bioethanol increases (G7-6);

- The production of citric acid from *Aspergillus niger* has been studied from bulk vending machine coffee grounds and from espresso capsules. No significant difference was observed when replacing vending machine grounds with espresso coffee grounds in capsules. (G7-7);

- The growth of selected bacteria, yeasts and fungi on coffee grounds obtained by brewing, espresso coffee and capsules were determined. The results obtained showed that mainly fungi can grow on coffee grounds. It was also found that fungi grow intensively on brewed coffee, espresso coffee and capsule coffee (G8-19);

- It has been established that the cultivation of microalgae or cyanobacteria is a promising way to produce biomass, and hence a way to obtain biofuels G (8-16).

Asst. Prof. Dr. Galina Yordanova in a number of scientific research projects (14 scientific intra-university projects), of which she is a project manager in 2. She also participates in three national scientific and educational projects, has 1 published application for invention.

From the general description of the scientific research and applied scientific activities of Assistant Professor Yordanova, it is evident that the scientific publications are entirely in the field of Biotechnology, specifically "Technology of biologically active substances (incl. enzymes, hormones, proteins)" and fully correspond to the direction of the announced competition.

4. Assessment of the candidate's pedagogical training and activities.

The senior assistant professor's work experience is 18 years, which means that she has managed to gain extensive teaching experience. Her pedagogical training meets the requirements for holding the academic position of "associate professor". Over the past three years she has:

- She gave lectures and exercises to students in the Bachelor's, Professional Bachelor's and Master's degree programs in various disciplines related to the specialty she applied for: Microbiology; Biotechnological production; Biotechnology of pharmaceutical and agrobiological agents; Technology of milk and dairy products; Preservation; Microbiology and virology; Food legislation and food policy; Food quality management; Medical microbiology.

All listed disciplines are taught at the University "Prof. Dr. Assen Zlatarov" - Burgas;

- Developed and updated 13 curricula: 6 for Bachelor's and 7 for Master's degree programs;

- Supervisor of 10 graduates in the Biotechnology major;

- Participated as a member of the General Assembly of the Bulgarian Academy of Sciences and the Faculty Council of the Faculty of Technical Sciences from 2022 to present;

- Participated as a member of the committee for conducting the State Examination OKS "Bachelor", specialty - "Biotechnology" and "Food Technology";

- Participated as a member of the committee for conducting an exam in biology for the Master's degree in Medicine.

5. Basic scientific and applied scientific and applied contributions.

The contributions from the research activities of Senior Assistant Professor Galina Yordanova can be classified as scientific and applied science.

Major scientific contributions

Here I would like to mention the monograph entitled "Methods for Improving Quality in Organizations in the Chemical and Biotechnology Industry".

Main scientific and applied contributions

I would include the following:

1. Biodegradation of phenol and phenolic derivatives with immobilized microbial cells on various carriers – immobilized *Aspergillus awamori* NRRL3112 cell systems were obtained and *Trichosporon cutaneum* R57 on polyamide – PA membrane and polyacrylonitrile – PAN membrane. Experiments on phenol biodegradation were carried out in a spiral-wound membrane

bioreactor with immobilized *Aspergillus awamori* NRRL 3112 strain. Two immobilized systems of *Aspergillus awamori* NRRL3112 were also obtained and *Trichosporon cutaneum* R57 on modified polyamide granules. The advantages of the two combined immobilized systems for biodegradation of phenol and phenol derivatives compared to the separate immobilized systems of the two strains and free cells have been proven;

2. Quality control and management in various food production and laboratories – corrective actions have been established that should be applied whenever there are discrepancies in the testing policy and procedures of the management system of a given enterprise – experiments were conducted in a laboratory for testing milk and dairy products, in a company producing meat and meat products, in a beer production company, in a microbiological laboratory for the detection of *Salmonella* species (the program for checking the suitability for microbiological analysis under the Quality in Microbiology PT Scheme /QMS/ milk matrix, etc.;

3. Yeast – vitality and viability – issues of the quality of *Saccharomyces cerevisiae* yeast, in terms of their viability and yeast lifting force, a new automated image-based cytometric method for determining the total number and viability of yeast cells was established, investigated viability and freeze resistance of baker's yeast *Saccharomyces cerevisiae*. The results obtained from these studies will assist in the quality control of baker's yeast and the production of bakery products;

4. Application of molds and yeasts to obtain valuable bioproducts – here the issue of coffee grounds (waste in large quantities) is addressed: it can be used for the cultivation and development of two types of microorganisms *Aspergillus oryzae* and *Saccharomyces cerevisiae* ; when fermentation of coffee grounds obtained from a vending machine was carried out in the presence of an *Aspergillus oryzae* strain, the thermodynamic parameters of Gibbs energy, entropy, enthalpy and activation energy under different conditions have been determined; it can also be used as an additive to wheat bran in the production of the enzyme alpha- amylase , it can be used as part of the growth medium of the *Aspergillus oryzae* species and even alone as a medium; *Aspergillus oryzae* species has the ability to grow on coffee grounds and absorb them as a sole carbon source, producing bioethanol. This proves that microorganisms are able to absorb coffee waste and turn it into useful organic products.

6. Significance of contributions to science and practice

The contributions of the research of Assist. Prof. Dr. Galina Yordanova are mainly of a scientific and applied nature. All achieved results and contributions have direct application in the biotechnology and food industry. The presented citations are proof of the contributions. So far, a total of 15 citations have been noted for two articles by the candidate, which are referenced in Scopus and published in the journal *Biotechnology*. and *Biotechnological Equipment*. One of the publications - Brewing yeast viability measured using a novel fluorescent dye and image cytometer. Atanasova , M., Yordanova , G., Nenkova , R., Godjevargova , T., Dinev , D. *Biotechnology and Biotechnological Equipment*, 2019, 33 (1), pp . 548–558 has a total of 10 citations. The other - Biodegradation of phenol and phenolic derivatives by a mixture of immobilized cells of *Aspergillus awamori* and *Trichosporon cutaneum*. Yordanova , G., Godjevargova , T., Nenkova , R., Ivanova , D. *Biotechnology and Biotechnological Equipment*, 2013, 27(2), pp . 3681–3688 has a total of 5 citations. The citations are from the last 4 years. In order to have more citations, it is necessary to publish scientific results in refereed and indexed publications in world-renowned Web databases. of Science and Scopus. The scientific contributions show that the scientific competence of Assistant Professor Dr. Galina Yordanova is specifically in the field of Biotechnology, i.e. fully in the announced direction of the competition.

7. Critical notes and recommendations

I have no critical remarks about the content and manner of presentation of the documents in the competition.

8. Personal impressions and opinion of the reviewer.

I have known Assistant Professor Dr. Galina Yordanova since the time she was developing her doctoral thesis at the university. I have participated in the scientific juries for the acquisition of the scientific degree "doctor" and in the competition for the academic position of "assistant professor". After 2016, I did not have an observation of her career development, but from previous years my observations are that she is persistent and hardworking.

CONCLUSION

The scientific output of Asst. Prof. Dr. Galina Yordanova is entirely in the field of the professional field of the competition. The submitted publications, citations and references for her lecturing and researching activities fully meet the national minimum requirements for holding the academic position of "associate professor", as well as the specific requirements of the Regulations on the conditions for acquiring scientific degrees and holding academic positions at the University "Prof. Dr. Assen Zlatarov" - Burgas. Based on familiarization with the presented scientific works, their significance, the scientific and scientific-applied contributions contained in them, as well as her lecturing and researching activities, I find it reasonable to propose Asst. Prof. Dr. Galina Yordanova to hold the academic position "associate professor" in the scientific field 5. Technical sciences, in the professional field 5.11. Biotechnologies, scientific specialty "Technology of biologically active substances (incl. enzymes, hormones, proteins)", for the needs of the Department of "Biotechnology" at the Faculty of Technical Sciences, University "Prof. Dr. Assen Zlatarov".

Reviewer:

/Prof. Dr. N. Vasileva Ivanova/

22.12.2024