

## OPINION

**by Professor Dr. Rumiana Dimitrova Tzoneva , Institute of Biophysics and Biomedical Engineering - Bulgarian Academy of Sciences**

Regarding competition for **“Associate Professor”** in area 4. Natural Sciences, Mathematics and Informatics, professional direction 4.3. Biological sciences, scientific specialty " Genetics ", announced in a state newspaper, issue 24 from 21. 03. 2025, for the needs of the Laboratory of "Regulators of Plant Growth and Development", Research Area "Plant Ecophysiology", Institute of Plant Physiology and Genetics, Bulgarian Academy of Sciences.

**Candidate's career and thematic development:** Krasimira Nedyalkova Tasheva graduated with a Master's degree in molecular biology at Sofia University " St. Kliment Ohridski ", Biology faculty, specialization in genetics, in 2000.

In 2010, she won a scholarship from the International Centre for Genetic Engineering and Biotechnology in Trieste, Italy, for Bioinformatics: Computer Methods in Molecular Biology.

In 2012, she received a scholarship through the European Economic Area (EEA) Financial Mechanism program. Department of Molecular Biology, University of Oslo, Oslo, Norway.

Between 2006 and 2011, she was enrolled as a doctoral student at the Institute of Plant Physiology with a scientific advisor, Assoc. Prof. Dr. Georgina Kosturkova. She successfully defended her thesis on the topic **“IN VITRO CULTURES OF RHODIOLA ROSEA L. – A STUDY OF THE OPPORTUNITIES FOR REPRODUCTION AND PRESERVATION OF THE SPECIES. AND FOR THE PRODUCTION OF BIOLOGICALLY ACTIVE SUBSTANCES”**.

Krasimira Tasheva worked as a biologist-specialist at the Institute of Genetics from 2001 to 2008. From 2008 to 2011, she successfully passed the 3rd degree associate professor and 2nd degree associate professor, while from 2011 to the present, she has held the position of chief assistant at the Institute of Plant Physiology and Genetics.

Dr. Tasheva has attended various short courses, including training in RT-PCR, basic molecular biology methods, "Using contemporary microscopic methods in biology," "Fluorescent analysis of bacterial cells isolated from food via automatic system," and courses related to public-private partnerships, finance, and more. Head Assoc. Prof. Dr. Krasimira Tasheva has participated in numerous projects, including those under COST Action, Projects under the Operational Program "Developed Human Resources" 2007-2013, the Ministry of Education, Youth and Science, Scientific Research Fund, Bulgarian Academy of Sciences, and others.

Head Associate Prof. Dr. Krasimira Nedyalkova Tasheva is the only candidate in the announced competition. The documents provided by the candidate for the academic position of "Associate Professor" are prepared according to the requirements of the Law for Development of Academic Staff in the Republic of Bulgaria and the Regulations for her application at the Institute of Plant Physiology and Genetics (IPPG) at the Bulgarian Academy of Sciences. Dr. Tasheva has a total of 887 points from the minimum requirements for the academic position of "Associate Professor," surpassing the required 540 points outlined in the Regulations on the Specific Conditions and Procedure for Holding Academic Positions at the IPPG-BAS.

**Publication activity:** In the present competition, Dr. Krasimira Tasheva participated with a total of 17 publications (15 scientific publications, 1 scientific review and 1 book chapter) outside the publications included in the doctoral dissertation, of which 16 were published in Scopus/Web of Science refereed journals with a total impact factor from 39. 218. Dr. Krasimira Tasheva participated in the competition with 189 citations without self-citations (374 points) of 34 publications.

In 7 of the articles, Dr. Tasheva is the first or corresponding author and collects 120 points out of the required minimum of 110 points for articles with a first or corresponding author according to the Regulations on the specific conditions and procedure for occupying the academic position of "Associate professor" at the Institute of Plant Physiology and Genetics in the Bulgarian Academy of Sciences. As of 27.06.2025, Dr. Tasheva. It also has an h-index- 5 and 102 noted citations without self-citations in SCOPUS .

**Scientific projects:** Dr. Krasimira Tasheva has participated in 3 national projects and 1 project under a bilateral agreement with the Bulgarian Academy of Sciences, and was leader at 2 national project a.

The funds raised by Dr. Tasheva for projects led by her amount to 154,584 BGN or 30 points. The total points collected by Dr. Tasheva for the scientific projects indicator are 120 out of the minimum required 70 points.

**Participation in scientific events:** Assistant Professor Dr. Krasimira Tasheva is a participant in 40 national and international conferences with poster or oral presentations.

**Research activity:** Research activity on Assistant Professor Dr. Krasimira Tasheva is in the field of biotechnology, genetics and bioinformatics and is mainly related to increasing plant productivity in order to modulate the biosynthesis of secondary metabolites with antioxidant properties and their use in socially significant diseases, as well as to preserve genetic diversity and endangered species.

## Basic scientific fields

### I. Development of *in vitro* cultures of valuable medicinal plants – modulation of biosynthesis of secondary metabolites and conservation of endangered species

- ✓ **An effective system for efficient micropropagation of medicinal plants has been developed**
- ✓ *Sideritis scardica* – conservation support and subsequent adaptation to an experimental field. The resulting plants exhibit a higher content of polyphenols and better antioxidant activity compared to cultivated plants [**Publication B4-01**].
- ✓ *Clinopodium vulgare* – developed an effective protocol for micropropagation. Comparison of the individual parts of the plant in terms of polyphenol content and antioxidant activity [**Publication B4-02**].
- ✓ *R. rosea* – micropropagation ensures the conservation of the endangered species and accelerated synthesis of biologically active substances [**Publication G7 4-06**]. Cytological identity with the wild-type plants has been confirmed [**Publication G7-12**].
- ✓ **Development of callus cultures for the production of secondary metabolites**
- ✓ The optimal conditions for effective induction of callus culture and its long-term cultivation have been determined [**Publication G7-09**].
- ✓ The influence of the composition of the culture medium on the antioxidant activity in callus cultures has been established. A high correlation has been established between the content of total phenols, flavonoids, and the antioxidant activity of plants [**Publication G7-10**].
- ✓ A mathematical model has been developed for the relationship between phytohormones in the nutrient medium and the successful development of callus culture plants [**Publication G7-12**].

### II. Use of medicinal plant extracts as therapeutic agents for socially significant diseases

#### Application in neurodegenerative diseases

- ✓ The extracts obtained from micropropagated and cultivated *Clinopodium vulgare*, *Sideritis scardica*, and *Salvia aethiopis* demonstrated a concentration-dependent cytotoxic effect on cervical carcinoma, breast cancer, colorectal adenocarcinoma, and hepatocellular carcinoma cells [**Publication B4-01, 02**].
- ✓ Aqueous extracts from the aerial part of wild and *in vitro* cultivated *C. vulgare* plants inhibit cancer cell migration and induce apoptosis [**Publication B4-04**].
- ✓ Total aqueous extract of *Salvia aethiopis* was characterized by high-resolution mass spectrometry, identifying 21 bioactive compounds, of which 12 were discovered for the first time in the species. Cancer lines treated with it showed inhibited proliferation, migration, and cell cycle arrest, as well as development of the apoptosis process [**Publication G7-01**].

#### Application in neurodegenerative diseases

- The application of extracts from *in vitro* propagated and cultivated *Marrubium plants vulgare*, *Clinopodium vulgare* and *Sideritis scardica* on *in vivo* Alzheimer's model effectively affects induced memory and cognitive impairment in rodents [**Publication B4-03**].
- *M. vulgare* extract has a protective effect on cholinergic mediation in the hippocampus, increases noradrenaline levels in the brain, restores impaired expression of the transcription factor pCREB (cAMP response element-binding) in the cerebral cortex and reduces oxidative stress in Alzheimer's induced *in vivo* model [**Publication B4-03**].
- *M. vulgare* extract, in healthy experimental animals, has a protective effect by increasing the expression on related to memory and apoptosis genes (BDNF, CREB and Bcl2) [**Publication B4-03**].
- *M. vulgare* on the working capacity has also been proven on working memory, reducing acetylcholinesterase (AChE) activity in the hippocampus, alleviating oxidative stress (especially in the cerebral cortex) and improving *in*

*vivo* antioxidant potential, as well as regulating the levels of p-CREB/BDNF proteins in the cerebral cortex and hippocampus [**Publication G7-03, 02**].

- The combined application of *S. scardica* and *C. vulgare* stimulates the dopaminergic signaling in the cortex in healthy rodents, with the aqueous extract of *S. scardica* not causing suppression of the activity of acetylcholinesterase and does not exhibit anxiolytic effects [**Publication G7-04**].
- Multitarget combination, includes vegetable extracts (leaves from olive wood and green tea), which are rich on bioactive substances, effectively affects the short-term, the long-term and spatial memory, which is associated with a decrease on the activity on acetylcholinesterase and lipid peroxidase, increase on the activity on superoxide dismutase in the cortex on the brain, as well as with growing on the activity on enzymes catalase and glutathione peroxidase, and levels on neurotrophic (BDNF) and transcription (pCREB ) factor in the hippocampus [**Publication G7-05**].

## **II. For tissue regeneration**

- It has been found that the application of vegetable extracts from *Plantago major* (deciduous plantain) and *Calendula officinalis* (marigold), alone and/ or in combination with mucus from *H. aspersa* (garden snail) on superficial wounds leads to more effective healing in an experimental model on rodents. The best regenerating effect is observed upon application of a combination of the extracts, suggesting the presence of a synergistic interaction among the three components in the attached experimental therapy [**Publication G7-07**].

**Scientific topics of the candidate:** The scientific topics of Assistant Professor Krasimira Tasheva are clearly outlined and include the use of biotechnology, genetics, and bioinformatics, as well as contemporary methods for developing innovative *in vitro* models in valuable vegetable species to increase their productivity and stimulate the biosynthesis of secondary metabolites with antioxidant properties. Efforts are directed towards their successful use in socially significant diseases, such as cancer and neurodegenerative diseases, for storage in the gene pool, and for the sustainable conservation of endangered species, highlighting the importance of this topic for both science and society.

**Graduate Student Leadership:** Assistant Professor Dr. Krasimira Tasheva is the supervisor of two graduate students – one bachelor's and one master's (Sofia University "St. Kliment Ohridski").

**Lectures and presentations:** Assistant Professor Dr. Krasimira Tasheva participated in the "Career Forum" 2024, European Night of Scientists, 2023, "Science for Business" Meeting, 2023 and Lecture "Modern Directions of Natural Sciences", 2023.

**Organizational and administrative activities:** Dr. Krasimira Tasheva participates in the Academic Ethics Committee and the Accreditation Committee of the Doctoral Program "Genetics" at the Institute of Genetics-BAS.

**Conclusion:** From the presented scientific works on Senior Assistant Professor Dr. **Krasimira Tasheva**, it is evident that the overall scientific production on the candidate, completely satisfies and exceeds the minimum requirements on The law for academic development in the Republic of Bulgaria and the specific criteria for acquisition on scientific title "Associate Professor" at the Institute of of Plant Physiology and Genetics - Bulgarian Academy of Sciences for professionally direction " Biological" sciences ", scientific specialty " Genetics ".

The mentioned scientific contributions have both fundamental and scientific-applied significance for the development primarily of plant physiology, genetics and biotechnology. The presented scientific works and formulated contributions testify to a thorough study of biological processes. The development of valuable *in vitro* models for gene pool conservation and sustainable conservation of threatened plant species is also a recognition of the significance of the scientific work of Assistant Professor Dr. **Krasimira Tasheva**.

Taking into account all of the above, I will confidently vote positively in the scientific jury for awarding Dr. **Krasimira Tasheva** the academic title "Associate Professor".

30.06.2025      Prof. Dr. Rumiana Tzoneva  
Sofia