

## **STATEMENT OF OPINION**

**by Prof. Vili Krasteva Stoyanova, MD, PhD**

Department of Pediatrics and Medical Genetics, Medical University, Plovdiv

on the dissertation work of **SIBEL DZHEVDET AZIZ**, with topic:

**STUDY OF GENETIC VARIABILITY IN VEGETABLE CROPS REPRESENTATIVES  
THROUGH MOLECULAR MARKERS**

presented for acquiring the educational and academic degree "Doctor" in the field of higher education: "Natural sciences, mathematics and informatics " Code 4; Professional field: " Biological Sciences " Code 4.3; PhD program: " Genetics".

### **Scientific supervisors:**

Prof. Teodora Atanasova Staykova, PhD

Prof. Nasya Borisova Tomlekova, PhD

### **General Presentation of the Procedure and the Doctoral Student**

Referring to Order No. RD-21-457/02.03.2023 of the Rector of University of Plovdiv "Paisii Hilendarski" (PU), I am appointed as a member of the scientific jury responsible for overseeing the dissertation defense of SIBEL DZHEVDET AZIZ, a PhD student in regular education at the Department of "Developmental Biology". The dissertation topic is "Study of Genetic Variability in Vegetable Crop Representatives through Molecular Markers" for the acquisition of the educational and scientific degree "Doctor" in the field of higher education "Natural Sciences, Mathematics, and Informatics", professional field "Biological Sciences", PhD program "Genetics". The author's scientific supervisors are Prof. Dr. Teodora Atanasova Staykova and Prof. Dr. Nasya Borisova Tomlekova.

The presented materials are in compliance with the Regulations for the Development of the Academic Staff of the PU.

The dissertation comprises 200 printed pages, which include the introduction, literature review, aim and objectives, methods and materials, results and discussion, comparative analysis of the effectiveness of applied molecular techniques for the study of genetic variability in tomatoes, potatoes, and beans, conclusions, contributions, and bibliography. It consists of 51 figures, 26 tables, and 323 cited literature sources.

### **Biographical data for the PhD student**

Sibel Dzhevdet Aziz was born in 1993. She graduated from the Faculty of Biology at the University of Plovdiv "Paisii Hilendarski" with a degree in "Bioinformatics" (2012-2016) and "Teacher of Biology" (2015-2016), and in 2017 she completed her studies in "Biotechnological Microbiology". Since January 7, 2017, she has been working as a biologist specialist in the "Molecular Biology" Laboratory in the Breeding Department at the Maritsa Vegetable Crops Research Institute. In May 2019, she was promoted to assistant in the same laboratory. She has also completed specializations in the following topics: "Proteomic studies for detection of mutations in vegetable crops" (2022) and "Investigation of genetic variability in members of the Solanaceae family using molecular markers" (2019). Since 2019, she has been a full-time PhD student in the scientific field of "Genetics" at the Faculty of Biology at the University of Plovdiv "Paisii Hilendarski".

### **Topic relevance**

Tomatoes, potatoes, and common beans are crops of great economic importance. Creating new varieties with high production potential, disease resistance, and tolerance to environmental factors is a challenge for scientists. Genetic diversity is essential for successful plant breeding and management.

In recent years, molecular techniques have provided new opportunities to assess genetic potential. Suitable DNA markers for genotyping make it possible to identify phenotypic changes resulting from environmental factors. Such studies contribute to the creation and maintenance of better varieties, increasing food production and nutritional impact.

This topic is relevant because the selection of appropriate techniques for studying genetic variability in these three crops offers perspectives in both fundamental and applied aspects.

### **Knowing the problem**

The literature review is expertly presented and highly informative. The doctoral student has demonstrated a thorough understanding of the current state of the problem, which she outlined in six main parts of the "Literature Review" chapter. She covered the importance of vegetable crops, the application of mutagenesis and molecular genetic markers in plant biotechnology, as well as specific molecular marker techniques for detecting mutations.

A detailed review of the economic significance of the three vegetable crops - tomatoes, potatoes, and beans - and research on the genetic diversity of the three vegetable crops through molecular techniques is presented.

The purpose of the dissertation work and the tasks related to its implementation are logically derived from the literature review.

## **Methodology of the research**

The description of the methodology in the "Materials and methods" chapter is precise and detailed. The doctoral student has appropriately selected and described modern methods, such as SSR and ISSR marker systems based on microsatellites, and ISAP of polymorphism in short movable elements SINE and COS II (restriction polymorphism). The analytical methods used are adequate for achieving the set goal.

## **Characterization and evaluation of the dissertation work and contributions**

The dissertation work analyzes the applicability of four molecular marker techniques for studying genetic variability in selected representatives of three vegetable crops - tomatoes, potatoes, and beans.

The results allow the doctoral student to indicate that the SSR technique is the most effective in establishing polymorphism in tomatoes, while for potatoes, the ISAP and ISSR techniques are the most effective. For beans, the ISSR technique proves to be the most efficient.

This study marks the first time the ISAP molecular method has been applied to tomatoes, revealing the potential of seven SINE families, with SolS-II-F/SolS-II-R and SolS-IIIa-F/SolS-IIIa-R being the most effective in identifying five tomato varieties.

In the case of mutant potato lines, highly polymorphic profiles were generated using two single-family and one multiplex ISAP reactions. All output, including five mutants and two control genotypes, amplified unique ISAP profiles for the studied collection.

For the first time, through the eleven ISSR reactions conducted, high polymorphism was established in the studied Bulgarian mutant bean lines.

This study is the first of its kind in Bulgaria and provides vital information on the established genetic variability based on molecular markers among Bulgarian varieties and lines of three economically important vegetable crops. It was conducted at a high modern level, and the results obtained have scientific and practical value. Therefore, they can be considered as new and enriching existing knowledge in the field.

## **Assessment of the PhD student's publications and personal contributions**

The PhD student has made valuable contributions to the field through the submission of two scientific publications, where she is the first author, published in journals with quartile rankings Q3 and Q4. Additionally, she has contributed to

a book chapter that discusses some of the methods utilized in her dissertation work.

### **Autoabstract**

The submitted autoabstract is well-written and accurately summarizes the research findings, meeting all necessary requirements.

I have thoroughly reviewed the dissertation work and have found no significant critical remarks to make.

### **Recommendations for future use of dissertation contributions and results**

The research conducted by the PhD student has the potential to be used as a foundation for future research in various breeding programs. These contributions and results should be considered when designing future research projects, as they provide new and relevant information that can be built upon in the future.

### **CONCLUSION**

The dissertation work conducted by Sibel Dzhevdet Aziz represents an outstanding contribution to the field of genetics. The scientific, scientific-applied and applied results presented in the dissertation are original, innovative and in line with the requirements set by the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the Implementation of LDASRB and the relevant Regulations of PU "Paisii Hilendarski".

The PhD student demonstrates a broad knowledge of genetics and laboratory skills, and has shown remarkable consistency and systematic approach in solving scientific problems. The autoabstract accurately reflects the content of the dissertation and provides sufficient information to understand the research findings.

Therefore, as a member of the Academic Jury, I strongly recommend awarding the educational and academic degree "**Doctor**" to **Sibel Dzhevdet Aziz** in the field of higher education: 4. Natural sciences, mathematics and informatics, professional field: 4.3 Biological sciences, doctoral program Genetics.

23.03.2023

Prepared the opinion: .....

/Prof. Vili Stoyanova, MD, PhD/