

**STATEMENT**  
**by Assoc. Prof., Stoyan Angelov Shishkov, PhD**  
**Sofia University "St. Kliment Ohridski", Faculty of biology**  
**about the dissertation work**  
**"Influence of biotic and abiotic factors on stem parasitism holoparasitic plants**  
**of the genus *Cuscuta*"**  
**of Assoc. Prof. Lyuben Ivanov Zagorchev, PhD**  
**presented for the awarding of the scientific degree "Doctor of Sciences" in Higher**  
**Education area 4. Natural sciences, mathematics and informatics; Professional area 4.3.**  
**Biological sciences, "Molecular Biology"**

**Biographical data about the author.** Assoc. Prof. Lyuben Zagorchev was born in 1981 in Sofia. In 2006, he graduated with a master's degree in biochemistry at the Faculty of Biology of the University of St. Kl. Ohridski". In 2012, he was awarded the ONS "Doctor" in direction 4.3 Biological Sciences, specialty "Biochemistry". He has been a teacher at the Department of Biochemistry since 2010. In 2017, he was elected an associate Assoc. Prof. at the same department. He gives lectures at OCS "Bachelor" and OCS "Master" in disciplines "Biochemistry", "Molecular-biological methods", "Molecular biology of the plant cell" and "Omics technologies" to students from various specialties of Sofia University.

Under his scientific guidance, 1 doctorate, 5 master's and 9 bachelor's theses were defended. He is the supervisor of 1 doctoral student.

Assoc. Prof. Zagorchev is the head of 7 research projects financed by Bulgarian and international scientific funds (attracted funds BGN 1,390,000). He is a participant in 13 projects.

He is the author of 44 scientific works: 33 articles with IF or SJR, 5 chapters of monographs, as well as 5 teaching aids. The results of his research have been reported at 41 international and 22 national scientific forums. His registered publications in Scopus are 35 and in Web of Science - 28. He has been cited in these platforms more than 490 times and more than 430 times, respectively. Its h-index is 8.

**View the documentation.** The documents presented by associate Assoc. Prof. L. Zagorchev regarding the defense procedure, the dissertation work and the abstract meet the requirements of the LDASRB and the Regulations for its application.

**Relevance of the dissertation topic.** The paper examines parasitism in holoparasites of the genus *Cuscuta* at the molecular-biological level and reveals the importance of biotic and abiotic factors for parasite-host relationships. The relevance of the dissertation topic being developed

is undoubted due to the negative impact of parasites of the genus *Cuscuta* on agricultural plantations and their ecological significance.

**Evaluation of the dissertation work.** The dissertation is laid out in 189 standard pages, illustrated with 14 tables, 86 figures and 7 appendices (100 pages). The literature reference contains 337 literary sources. It covers the following sections - introduction, literature review, aims and objectives, materials and methods, results, discussion, conclusions, contributions and literature.

The literature review (39 pages) introduces plant parasitism - the classification of parasitic plants and their importance. The focus is on holoparasites of the genus *Cuscuta* - their biological development and their impact on basic biochemical processes occurring in the host. The influence of abiotic and biotic factors on parasite development is presented in depth. Stress and adaptation to it are discussed. Emphasis is placed on the molecular basis of the pathogenesis associated with parasitism. The author acknowledges the incompleteness of knowledge about the effects of stressors on plant parasites and outlines the need to develop model pairs of host and parasite plants to study stressor effects.

The aim of the dissertation is to characterize the species diversity of the genus *Cuscuta* in Bulgaria and to investigate the influence of biotic and abiotic factors on the parasite-host relationship. 6 tasks were formulated to prove the presented 3 scientific hypotheses.

In the "Materials and methods" section, the modern methods used for growing plants and conducting molecular taxonomy and phylogenetic analyses; metagenomic, transcriptome and protein analysis and others are detailed. Methods for the detection of 4 plant viruses are also applied. The set of applied statistical methods of results analysis and software products is extensive.

The results (75 pages) of the studies included in the dissertation are presented separately in five subsections: distribution, spectrum of hosts and genetic diversity of *Cuscuta* in the country; influence of abiotic and biotic factors on seed germination and developmental stages before infection as well as after infection; influence of *Cuscuta* on host metabolism and soil microcommunities; interaction of the combination with other biotic factors. Assoc. Prof. Zagorchev's results for a wider distribution and infecting more hosts than the studied species prove his hypothesis of a higher invasive and parasitic potential of *C. campestris* than the local species.

Assoc. Prof. Zagorchev convincingly proves with the results his other hypotheses - the influence of abiotic and biotic stress factors on the interaction between the parasite and the host and the occurrence of changes in the metabolism of the studied plant parasites.

The contents of the Discussion section (21 pages) reflect the obtained experimental data compared with available literature data. The conclusions are logically derived and support the working hypotheses of Assoc. Prof. Zagorchev (2 pages).

**Dissertation Contributions.** The dissertation of Assoc. Prof. L. Zagorchev has an indisputable innovative, scientific, scientific-applied character. For the first time commented on the influence of abiotic stress on parasitic plants from *Cuscuta* spp. and their adaptation to it under the influence of the host. It proves the influence of gall-forming insects of the genus *Smicronyx* on the photosynthetic apparatus of *C. sampestris*. Adds facts about the distribution of the genus *Cuscuta*.

The submitted abstract reflects the content of the dissertation.

In connection with the dissertation, Assoc. Prof. Zagorchev has published 17 articles and 3 chapters of monographs, being the lead author in 16 of them. In journals with quartile Q1 12 articles were published, 3 with Q2 and 2 with Q3.

**Critical remarks.** I have no objections to the dissertation work.

**Summary assessment.** The certificate of compliance with the minimum state requirements for the scientific degree "Doctor of Sciences" presented by Assoc. Prof. L. Zagorchev is accurate and reflects the fact that it significantly exceeds the scientometric indicators. The number of points achieved is 1156 compared to the required minimum number of 350 points.

## CONCLUSION

The dissertation of an associate Assoc. Prof. L. Zagorchev on the topic "Influence of biotic and abiotic factors on the parasitism of stem holoparasitic plants of the genus *Cuscuta*" is his personal work. It is precisely written and the data is expertly interpreted. It provides significant contributions of a scientific and scientific-applied nature. The dissertation work fully satisfies the criteria of the LDASRB, the Regulations for its implementation, the Regulations for the implementation of the LDASRB of Sofia University for obtaining the scientific degree "Doctor of Sciences".

The above gives me the reason to give a positive assessment of the work and to recommend to the members the Scientific Jury to award Associate Assoc. Prof. Dr. Lyuben Ivanov Zagorchev the scientific degree "Doctor of Sciences" in Higher Education Department 4. Natural Sciences, Mathematics and Informatics, Professional direction 4.3. "Biological sciences, Scientific specialty: "Molecular biology.

06/08/2023

Signature:

/prof. Stoyan Shishkov/