

## REVIEW

on a dissertation for obtaining the scientific degree "Doctor" in the area of higher education 4. Natural sciences, mathematics and informatics, professional field 4.4. Earth Sciences, scientific specialty Ecology and ecosystem protection

**Author:** Petya Georgieva Zaharieva, PhD student, Department of Agroecology and Environmental Protection, Agricultural University - Plovdiv

**PhD thesis title:** HEAVY METALS CONTENT IN FISH AND THEIR PARASITES FROM THE DANUBE RIVER – ECOLOGY AND BIOINDICATION

**Reviewer:** Gana Minkova Gecheva, PhD, Assoc. Prof., Plovdiv University „P. Hilendarski, area of higher education 4. Natural sciences, mathematics and informatics, professional field 4.3. Biological Sciences, scientific specialty Ecology and ecosystem protection

Appointed for a member of the Specialized scientific jury by the Rector of the Agricultural University with Order No. RD-16-1117/31.10.2022.

### 1. Relevance of the problem.

Environmental pollution has been a subject of scientific researches for decades and continues to be relevant. The current PhD thesis presents data from studies of 3 economically important fish species from the Bulgarian section of the Danube River. For one of them, the first data for the country are reported. Given the risk to human health and the scarcity of data at the national level, I consider the problem to be highly topical.

### 2. Purpose, tasks, hypotheses and research methods.

The aim of the dissertation is to study the content of heavy metals in fish and their parasites from the Danube River. It is logically linked to the 5 tasks set. The precision and thoroughness of the formulation of the tasks, which cover seasonal and annual changes, as well as the circulation of heavy metals between the different matrices, is impressive. The collection of samples from the three matrices, samples of tissues and organs of fish, samples of fish for helminths, laboratory processing, statistical analyzes are precisely performed and comply with the regulatory documents. They build a secure foundation for achieving the goal and tasks.

### 3. Visualization and presentation of the obtained results.

The results are precisely presented and illustrated with high quality figures. The structuring of the rich set of results and their presentation is logical and demonstrates skills in interpreting data in a highly scientific style with ease of perception.

### 4. Discussion of the results and used literature.

The data analysis and comparisons made are impressive. A number of the presented results are new, such as the bioconcentration factors for Cu and Cd in *P. laevis* of bream and bream versus water. The literature used is rich – it includes 349 sources, of which 306 are in English. I would also emphasize the significant number of standards and regulations that the PhD student followed in her studies.

#### **5. Contributions to the dissertation.**

Twelve original contributions are presented, which I fully accept. They are not distinguished as scientific and scientific-applied, probably due to the fact that the wide-spectrum significance of the results determines their character, both as strictly scientific and as applied.

#### **6. Critical remarks and questions.**

I have no critical notes. Based on the importance of the studies, the laboriousness of the field studies, the precision of the laboratory studies, the approach of analyzing the obtained data, I consider PhD student Petya Zaharieva to be an excellent young scientist and I wish her to continue her research with the same enthusiasm. Given the rich data set, I recommend shaping future papers with the unpublished results.

#### **7. Published articles and citations.**

Two articles with the results of the dissertation have been published in an international journal indexed in the Web of Science.


The presented abstract objectively reflects the structure and content of the dissertation.

#### **CONCLUSION:**

Based on the learned and applied by the PhD student, different research methods, correctly performed experiments, summaries and conclusions, I believe that the presented dissertation meets the requirements of ZRASRB and the Rules of the Agricultural University for its application, which gives me reason to evaluate it **POSITIVE**.

I would like to suggest to the esteemed Scientific Jury to also vote positively and to award Petya Georgieva Zaharieva the educational and scientific degree "Doctor" in the scientific specialty "Ecology and Ecosystem Protection".

28.11. 2022 г.

Reviewer:   
(Assoc. Prof. Gana Gecheva)