

OPINION

of DSc Svetlana Dimitrova Simova, professor at IOCCP-BAS
for a PhD Thesis for awarding the educational and scientific degree "Doctor"
in the field of higher education 4. Natural sciences, mathematics and informatics,
professional field 4.2. Chemical sciences, scientific specialty "Organic chemistry"

Author: Desislava Plamenova Gerginova

Topic: "NMR metabolomics of bee honey and wine"

Scientific supervisors: Prof. DSc. Svetlana Simova (IOCCP - BAS) and
Assist. Prof. Dr. Yavor Mitrev (IOCCP - BAS)

1. General presentation of the procedure and the doctoral student

The set of materials on electronic media presented by Assistant Dessislava Gerginova is detailed, consistently arranged and sustained. The materials are in accordance with the Regulations for the Development of the Academic Staff in IOCCP-BAS, and meet the criteria of IOCCP-BAS for the acquisition of the scientific and educational degree "Doctor". They include all administrative and scientific documents necessary for the procedure.

D. Gerginova joined the Bulgarian NMR Centre in 2013 as an intern under project BG05M2OP001-2.013-0001 of the Ministry of Education and Science "Student Practices - Phase 1", financed by OP NOIR as a correspondence student at the University of Chemical Technology and Metallurgy in Sofia, specialty "Inorganic Chemical Technologies". She became interested in the depts of organic chemistry and received bachelor's and master's degrees with diploma theses prepared at IOCCP-BAS. Within the term for the regular doctoral studies, she got the right to defense and presented her dissertation work dedicated to the combined use of NMR spectroscopy and chemometrics for study of food products.

2. Topicality of the subject

NMR metabolomics is a current scientific field that is new to the laboratory, and the studies on honey and wine set a strong foundation for research in various applications. The successful application of different chemometric approaches to determine the authenticity of food is at an advance level and could have not only scientific but also practical applications.

3. Knowledge of the problem

Within the framework of the PhD Thesis, a very good knowledge of the literature in this scientific field is shown, supported by the successful application of various approaches to obtain reliable results and their competent interpretation.

4. Research methodology

A large number of different experimental and theoretical methods were used to achieve the goals of the PhD Thesis, which are described in the literature review and characterized in detail in the experimental part.

5. Characterization and evaluation of the PhD Thesis and its contributions

The dissertation follows the standard arrangement for an extensive scholarly scientific work, accompanied by substantial illustrative material and appendices. The formatting is at a modern level, which further facilitates the reading of the well-written work. It should also be emphasized the precision and artistry inherent of Assist. Gerginova in the presentation of the results.

The obtained results can be characterized as a novelty for science - proving with new means essential new aspects of already existing scientific fields, and enriching the existing knowledge. The following important contributions can be noted in the Thesis:

- methodology for determining components in bee honey and pine candy by means of ^{13}C NMR spectra;
- determination of chemical profile of organic components in honey from Strandzha;
- discovery of new biomarkers for honey with different botanical, geographical and entomological origin;
- developed quick methods for recognizing diluted honey and wine;
- method for calculation of specific optical rotation of honey according to the sugars it contains.

6. Evaluation of the publications and personal contribution of the doctoral student

Four publications are attached to the dissertation - three in renowned international publications with an impact factor (two Q1 and one Q4) and one in the BAS journal. They reflect part of the dissertation work, substantial parts of which are unpublished data. In three of the

publications, D. Gerginova is the first author, which testifies to her significant personal contribution to them. Several citations have already been noticed, which indicates the presence of interest in the presented results. A report on many participations in scientific conferences at home and abroad on the subject of the Thesis is presented. It should be noted the significant number of oral reports delivered by the doctoral student.

A desire for independent work, curiosity about a number of topics and in-depth research of novelties is characteristic of Assist. Gerginova. It should be noted that her knowledge and skills in statistical methods and chemometrics are largely the result of self-training.

7. PhD Thesis Abstract

The abstract is in good accordance with the content of the PhD Thesis. It reflects the main results obtained and the conclusions drawn.

8. Recommendations for future use of the Thesis contributions and results

Main recommendation for the future use of the contributions and results is publication of the results in appropriate scientific journals, as well as in popular scientific literature. Additionally, attempts to contact administrative bodies and manufacturers for direct application in practice of some of the methods is recommended.

CONCLUSION

The documents and materials presented by Assistant Eng. Desislava Gerginova meet all the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Regulations for the Implementation of the ADASRB, the Regulations for the Implementation of the ADASRB of the Bulgarian Academy of Sciences and the Regulations of IOCCP-BAS.

The PhD Thesis contains scientific and scientific-applied results, which represent an original contribution to science and meet all the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Regulations for the Implementation of the ADASRB and the Regulations for the Implementation of the ADASRB of the Bulgarian Academy of Sciences. The presented materials and Thesis results fully comply with the specific requirements of the Regulations of IOCCP-BAS for the application of ADASRB. The dissertation shows that PhD student Assist. Eng. Desislava Gerginova possesses in-depth

theoretical knowledge and professional skills in the scientific specialty "Organic Chemistry", demonstrating qualities and skills for independent conduct of scientific research.

Due to the above, I confidently give my positive assessment of the conducted research, presented by the above-reviewed work, abstract, achieved results and contributions, and I propose to the honorable scientific jury to award the educational and scientific degree "doctor" to

Assistant Engineer Desislava Plamenova Gerginova

in the field of higher education 4. Natural sciences, mathematics and informatics, professional direction 4.2. Chemical sciences, scientific specialty "Organic chemistry"

29. 08. 2022

Opinion prepared by:

(Prof. DSc. Svetlana Simova)