

Review for ESD „Doctor“

REVIEW

**from prof. Maya Boyanova Georgieva, PhD – Department of Pharmaceutical chemistry,
Faculty of Pharmacy, Medical University - Sofia**

of a dissertation for awarding the educational and scientific degree 'doctor'

professional direction 7.3 “Pharmacy”

doctoral program. “Pharmacognosy and phytochemistry”

Author: *Vanya Ivanova Nalbantova*

Form of doctoral studies: regular

Department: Pharmacognosy and pharmaceutical chemistry

Topic: *Phytochemical study and possibilities of application of seeds from distributed in our country
Trigonella foenum-graecum L.*

Scientific supervisor: *assoc.prof. Niko Benbassat, PhD – Faculty of Pharmacy, MU – Plovdiv and prof.
Cedric Delattre, PhD - Institut Pascal, Université Clermont Auvergne,
Clermont-Ferrand, France,*

1. General presentation of the procedure and the PhD student

The presented set of materials on paper / electronic media is in accordance with Art. 70 (1) of I. Sec. Acquisition of educational and scientific degree "DOCTOR" and scientific degree "DOCTOR OF SCIENCES" at MU-Plovdiv; Regulations of MU-Plovdiv dated 28.01.2021 and includes the following documents:

- Application to the Rector of MU-Plovdiv for disclosure of the procedure for the defense of a dissertation work
- CV in European format with the doctoral student's signature
- a notarized copy of a higher education diploma
- orders for enrollment in doctoral studies; for deduction with right of defense
- an order for conducting an exam from the individual plan and a corresponding protocol for a passed exam or doctoral minimum in the specialty
- minutes from the departmental council for the preliminary discussion of the pre-dissertation work and the decisions taken for the disclosure of the procedure and for the composition of the scientific jury
- certificate of received credits from the group study plan at the Doctoral School of MU-Plovdiv;
- dissertation work
- abstract
- a list of scientific publications on the topic of the dissertation
- copies of scientific publications
- list of participations in scientific forums

- declaration of originality and authenticity of the attached documents

The doctoral student has attached 4 (four) scientific publications, of which 3 with IF. I accept all scientific papers as related to the topic of the developed dissertation work. In all publications, the PhD student is the first author.

I have no notes or comments on the documents.

2. Brief biographical data for the doctoral student

Vanya Ivanova Nalbantova, was born on 16.11.1991. She completed her higher education in the specialty "Pharmacy" with an OKS "Master" in 2016 at the Faculty of Pharmacy at the MU - Plovdiv. From 2019 to the present, she works as an assistant professor in Pharmacognosy in the Department of "Pharmacognosy and Pharmaceutical Chemistry" of the Faculty of Pharmacy at the Medical University - Plovdiv. In 2021 she is enrolled in specialization on Medicinal plants and phytopharmaceutical products. Since 2021, she has been a full-time doctoral student at the same department enrolled by Order No. R-2365/17.12.2021 in the Higher Education Region "7. Health care and sports", professional direction: "7.3. Pharmacy", doctoral program: "Pharmacognosy and Phytochemistry" with scientific supervisors assoc. prof. Niko Yosif Benbassat, PhD and Prof. Cedric Delattre, PhD at the Department of Pharmacognosy and Pharmaceutical Chemistry of the Faculty of Pharmacy at the MU - Plovdiv. By Order No. R-149/04.10.2024, she was dismissed with the right of defense for up to one year, starting from 01.10.2024.

3. Relevance of the topic and appropriateness of the set goals and tasks

The growing interest in the application in medical practice of more and more natural products, especially those of plant origin, necessitates both the search for new plant sources and a more detailed study of the already known medicinal plants, aimed at enriching the information about their possible biological activities. A widely distributed plant species is *Trigonella foenum-graecum L.*, known for its diverse application due to the content of a wide range of primary and secondary metabolites, revealing a serious potential in various fields of application. Unfortunately, there is still some uncertainty regarding the characterization of the chemical composition of the essential oil and the polysaccharide fraction contained in the seeds of *Trigonella foenum-graecum L.*

The orientation of the presented to me thesis proposed for review is focused towards filling the lack of detailed information in this direction, which certifies the relevance of the scientific development. In addition, I cannot fail to note the modern and adequate methodology applied within the framework of the research.

4. Knowing the problem

The literature review is comprehensive, the information in it sheds light on the essence of the problems and challenges discussed in the dissertation work in conducting the planned phytochemical study of seeds from *Trigonella foenum-graecum* L. (Greek fenugreek), common in our country, as well as in the study of the potential application of isolated from it pure substances (galactomannans). The overview is written concisely and with understanding, but at the same time it is comprehensive and reflects in full both the botanical characteristics of the studied plant and the information accessible in the literature about the available phytochemical characteristics of the seeds. A number of issues related to essential oils and the individual methods for obtaining and analyzing them are highlighted. Considerable attention has been paid to the manifested pharmacological activities of both the essential oil and the galactomannans, saponins, alkaloids and other biologically active components contained in the plant. In addition, the toxicity and application of both fenugreek oil and plant galactomannans as therapeutic agents have been reviewed..

The purpose of the dissertation - to carry out a phytochemical study of seeds from *Trigonella foenum-graecum* L. (Greek fenugreek), common in our country, as well as to study the potential application of pure substances isolated from it (galactomannans), is suggested by the literature review. For its implementation, 6 specific tasks have been identified, formulated precisely and in a logical sequence. I believe that the aim would be much better justified if the literature review ended with a short critical summary with clearly formulated conclusions that naturally lead to it.

5. Research methodology

In the Materials and methods section, the doctoral student has presented a detailed description of the methods used in the present scientific work. The manner of their presentation shows that the dissertation work has been developed through appropriately and correctly selected methods, allowing the achievement of the set goal and obtaining an adequate answer to the tasks solved in the dissertation work.

For the analytical control of the active substances in the obtained isolates, a variety of analytical approaches have been applied, including Gas Chromatography with Mass Detection (GC-MS), High Performance Liquid Chromatography (HPLC) with a fluorescence detector, as well as spectrophotometry in the ultraviolet and visible regions. In addition, high-performance anion exchange chromatography (HPAEC), GC and high-performance thin-layer chromatography were used to analyze the isolated polysaccharides. Attempts have been made to prove the structure of galactomannan isolated from the seeds of *Trigonella foenum-graecum* L.

It is noteworthy that in the work a very diverse methodology was applied, which does not give rise to doubt, and is a prerequisite for obtaining correct results.

6. Characterization and evaluation of the dissertation work

The dissertation is designed in 134 standard pages and includes the following main elements: Contents – 3 pages, Abbreviations– 1 page, Introduction – 2 pages, Literature review – 49 pages, Aim and tasks – 1 page, Materials and methods - 12 pages, Results and discussion - 44 pages, Conclusion - 2 pages; Conclusions - 1 page, Contributions - 1 page, List of scientific publications and participation in scientific events and projects - 2 pages, References - 13 pages. The data are illustrated with 22 tables and 34 figures. 190 literary sources are cited, of which 101 are from the last 5 years and 162 from the last 10 years, mainly in Latin.

7. Contributions and significance of the development for science and practice

As a result of the conducted experimental studies, the chemical composition of essential oil from the seeds of *Trigonella foenum-graecum L.*, common in Bulgaria, was characterized for the first time. For the isolation of the relevant essential oil, a newly created method for obtaining essential oils in minimal quantities was applied for the first time. A comparative analysis of the terpene composition of essential oil, from seeds cultivated in Bulgaria and India, was also made, showing significant differences in the composition of the oil, with different origins.

In pure form, from the polysaccharide fraction of the species, galactomannan was isolated and structurally identified from the seeds of *Trigonella foenum-graecum L.*

An HPTLC method for the identification and quantification of hydrolyzed galactomannan from seeds of the studied species was developed and validated. In addition, for the first time, a test was conducted on the epithelializing effect of a film coating of isolated galactomannan from *Trigonella foenum-graecum L.* and an extract from *Cotinus coggygria Scop.* on buccal mucosa of rats.

As a result of the conducted research, it was established that the isolated galactomannan can be a suitable basis for the creation of polysaccharide films. The research conducted shows that fenugreek galactomannans represent a promising basis for future studies on their potential as a carrier of plant medicinal substances with an anti-inflammatory effect.

8. Assessment of dissertation publications

The results of scientific research in the scientific work of the doctoral student are reflected in 4 scientific publications, **three** of which are published in a journal with **IF**. It is worth noting that in all scientific works related to the dissertation, the **doctoral student** is the **first author**, which unconditionally proves her personal participation in the conducted dissertation research, and

determines the personal credit for the formulated contributions and the obtained results. Parts of the dissertation have been presented at 3 international and 2 national scientific forums. The works presented logically reflect the results obtained by the doctoral student.

With regard to these scientometric indicators, the dissertation student meets the requirements for awarding the educational and scientific degree "Doctor", laid down in the Regulations for the development of the academic staff at the MU - Plovdiv.

9. Personal participation of the doctoral student

In addition to the above, the personal contribution of the doctoral student is clearly visible from the additional activities carried out by her, directly related to the topic of the dissertation work and including management of a doctoral project and participation in international mobility, as follows:

During her doctoral studies, the doctoral student was the lead researcher in Doctoral and Postdoctoral Project DPDP-05/2021 on the topic: "Phytochemical study of seeds of *Trigonella foenum-graecum* L. - Greek fenugreek cultivated in Bulgaria." Head: Assoc. Prof. Niko Benbassat, Implementation period: 09.2021 - 09.2022.

In addition, the doctoral student conducted international mobility in Clermont Auvergne INP, CNRS, Institut Pascal, Université Clermont Auvergne, F-63000 Clermont-Ferrand, France, for the period 08.05.2023 - 07.07.2023, where she performed part of the experiments included in the dissertation work.

10. Abstract

The abstract is formatted in 49 pages in accordance with the established requirements and correctly reflects the main applications and scientific-applied contributions of the dissertation work.

11. Critical remarks and recommendations

The paper is written in good scientific language, there are almost no typographical and grammatical errors in the text.

12. Recommendations for future use of dissertation contributions and results

The conducted research shows that fenugreek galactomannans represent a promising basis for future studies on their potential as a carrier of plant medicinal substances with anti-inflammatory effect, as well as as a basis for creating polysaccharide films. I would strongly recommend the doctoral student to continue to thoroughly research the possibilities of the considered plant species, as I believe that the results presented in the dissertation work are interesting and with future practical application.

CONCLUSION

The dissertation contains *scientific, scientific-applied and applied results, which represent an original contribution to science* and **meet all the requirements** of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of ZRASRB and the relevant Regulations of the Ministry of Education - Plovdiv. The presented materials and dissertation results **fully** correspond to the specific requirements of the MU - Plovdiv.

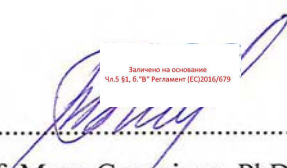
The dissertation shows that the doctoral student Vanya Ivanova Nalbantova possesses in-depth theoretical knowledge and professional skills in the scientific specialty "Pharmacognosy and Phytochemistry" by **demonstrating** qualities and skills for independent conduct of scientific research.

Due to the above, I confidently give my *positive assessment* of the conducted research, presented by the above-reviewed dissertation work, abstract, achieved results and contributions, and I *propose to the honorable scientific jury to award the educational and scientific degree "doctor"* to Vanya Ivanova Nalbantova in a doctoral program in "Pharmacognosy and Phytochemistry" in Higher Education District 7. "Health and Sports", Professional Direction 7.3 "Pharmacy".

21.10. 2024

Reviewer:

prof. Maya Georgieva, PhD



Задължено на основание
Чл.5 §1, 6°) Регламент (ЕС)2016/679