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ОБЩЕСТВЕНО ЗДРАВЕ И АНАЛИЗИ
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REVIEW

by Prof. Dr. Veselka Laleva Duleva, MD,

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Regarding: procedure for awarding the educational and scientific degree "Doctor", in professional field 7.1. Medicine, scientific specialty "Hygiene", according to No. RD-132/12.03.2025.

By order No. RD-132/12.03.2025 of the Director of the National Center of Public Health and Analyses, on the basis of Art. 30, para. 3 of the Regulations for the implementation of the Act on the development of the academic staff in the Republic of Bulgaria and in connection with Art. 30, para. 2 of the Regulations for the implementation of the Act on the development of the academic staff in the Republic of Bulgaria, Art. 4, para. 3, item 6 and Art. 19, para. 1 of the Regulations on the structure and activities of the National Center of Public Health and Analyses, Art. 69 of the Regulations on the conditions and procedure for acquiring scientific degrees and occupying academic positions in the National Center of Public Health and Analyses and decision of the Scientific Council of the National Center of Public Health and Analyses with protocol No. 5/11.03.2025. I am appointed as a member of the scientific jury as a reviewer of a dissertation on the topic:"Genetically modified organisms in food products on the Bulgarian market. Consumer awareness and attitudes" with author Assistant Professor Donka Dimbareva and scientific supervisors: Prof. Tsveta Georgieva, MD and Assoc. Prof. Teodor Panev, MD

Assistant Professor Donka Nikolova Dimbareva, graduated with a Bachelor's degree in Food Chemistry and Microbiology in 2011 and a Master's degree in Food Analysis and Control in 2012 at the Technology Faculty of the University of Food Technology in Plovdiv. In 2013, she graduated with a Master's degree in English Language and Methodology at the University of Plovdiv "Paisiy Hilendarski". In 2016, she defended her PhD in the field of biological sciences on the topic "Microbiological Preservation of Creamy Products" at the University of Food Technology in Plovdiv. Since 2017, she has been appointed as an assistant, and since 2018 as an Assistant Professor in the Department of "Applied Genomics and GMOs", Directorate "Analytical and Laboratory Activities" of the National Center of Public Health and Analyses.

From 2017 to 2024, she specialized and taught through a number of specialized courses - Federal Office of Consumer Protection and Food Safety (BVL), Training course around Food Safety and Risk Management with a spotlight on residues and contaminants, 2024; Parma Summer School, 2023; Ministry of Health, National Center for Infectious and Parasitic Diseases Microbiome Analysis and Bioinformatics, 2023; Federal Office of Consumer Protection and Food Safety (BVL), Max Rubner-Institut (MRI), 4th BVL/MRI course on Food Safety, Food Authenticity and Risk Management, 2022; Ministry of Health, National Center of Public Health and Analysis Health and Hygiene Requirements for Cosmetic Products. Legislation, 2017; SGS Bulgaria, БДС EN ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories. Conducting internal audits according to БДС EN ISO 19011 Guidelines for conducting audits of management systems, 2017; Ministry of Health, National Center of Public Health and Analysis, Harmonization of analytical approaches in laboratories for the study of genetically modified organisms, 2017; Ministry of Health, National Center of Public Health and Analysis, Molecular genetic markers - application in toxicology, microbiology and nutrition, 2017; Ministry of Health, National Center for Infectious and Parasitic Diseases, General Immunology and Allergology, 2017; MoniQA Food Scientist Training, PCR - methods for detection and quantification of food pathogens (theoretical part), 2010; EuroBul control, Sampling from accredited testing laboratories. Development of laboratory and mastering standardized sampling methods. Validation and/or verification of methods, 2010; EuroBul control, Current trends in building a management system in testing laboratories according to БДС EN ISO/IEC 17025. Management requirements. Technical requirements. Traceability of measurements, 2010.

Asst. Prof. Dimbareva participates in 3 projects - Microbiome and composition of breast milk - key factors, role and relationship with oral and intestinal microbiota in newborns, Contract No. KP-06-N61/9 of 22.12.2022, approved by the Scientific Research Fund (SRF) under the Ministry of Education and Science (MES); Aerosols obtained during the conversion of biomass and their organic extracts - cytotoxic and oxidative response of model lung cell systems. Project at the Scientific Research Fund under the Ministry of Education and Science under Contract No. KP06-N44-5 of 14.07.2021 and Validation of new methods for detection and quantification of new genetically modified organisms for the needs of official laboratories in the European Union - according to Regulation (EC) 1981/2006 and Regulation (EC) 120/2014.

Asst. Prof. Dimbareva is fluent in English and German. She is a member of the Bulgarian Society of Nutrition and Dietetics since 2017; the Bulgarian Public Health Association and the European Public Health Association and the World Federation of Public Health Associations since 2023; the Bulgarian Toxicological Society since 2023.

The dissertation submitted to me for review is in accordance with the procedure for acquiring the scientific and educational degree of "Doctor". The topic of the submitted dissertation, "Genetically modified organisms in food products on the Bulgarian market. Consumer awareness and attitudes" is relevant, innovative and practically significant. The issue under consideration is of particular importance and relevance due to the growing introduction of genetically modified organisms (GMOs) into agriculture and the food industry for the purpose of desired changes in the genetic material of plants, animals or microorganisms that may be of economic, selective, health or environmental benefit. Genetically modified organisms have the potential to bring a number of benefits and advantages in different areas – economic advantages in agriculture by increasing productivity and reducing losses for farmers; less use of pesticides and chemicals; more drought-resistant plants; in combating food shortages and improving food composition; in the production of medicines and vaccines; to reduce the harmful impact on the environment.

Despite the listed advantages, there are also risks, which necessitates conducting scientific research and reviewing the regulation. Bulgaria implements the Food Act and the Genetically Modified Organisms Act, which regulate the import, cultivation, commercialization and use of GMOs. European legislation introduces a number of requirements for the use and marketing of GM foods. The product must be safe and not endanger human or animal health, and be safe for the environment. With our country's accession to the European Union, the scope of health control includes checks for compliance with the labeling requirements for foods containing GMOs authorized by the EU. According to European regulations, producers will also be required to prove the technically unavoidable presence of GMOs, if this presence is not reflected on the food label.

In Bulgaria there is need for a more in-depth analysis of the current state of the problem.

The presented material is a completed dissertation, which covers 141 pages, of which 37 pages are a literature review. It contains a goal, tasks, materials and methods, results and discussion, conclusions, contributions. The bibliography contains 129 literary sources, mainly from the last 10 years, 7 of which are in Cyrillic.

Four scientific publications have been made on the topic of the dissertation, two of which are in English. Assistant Professor Dimbareva is the first author of three of the publications.

The purpose of the development is adequately and clearly formulated - to carry out objective analysis of the presence of genetically modified organisms on the market in Bulgaria, their compliance with the requirements of the legislation and to assess the level of awareness and perceptions of Bulgarian consumers regarding genetically modified organisms in general. The 5 specific tasks set: Selection of food products offered on the Bulgarian market for analysis of genetically modified organisms; Performing laboratory analyses to detect and identify GMOs in the samples taken; Comparison of the results obtained from the analyses with the information on the product labels in order to assess their compliance and transparency in the market; Conducting a survey among consumers to understand their awareness and attitudes regarding genetically modified organisms; Formulating recommendations for improving communication and understanding of GMOs are clear and fully sufficient to achieve the goal of the scientific work.

The object of the study is 143 different types of food samples for the presence of genetically modified organisms in products marketed in Bulgaria. 167 consumers in Bulgaria were surveyed. The following methods were applied:

Molecular genetic methods, which include DNA extraction from food products, quantitative and qualitative assessment of the extracted DNA, qualitative and quantitative determination of DNA by real-time PCR;

The survey method, which contains, in addition to data regarding age, gender, education and issues related to consumer perceptions in Bulgaria regarding modern biotechnology products;

Statistical analysis methods for which the Applied Biosystems software product – SDSv2.2.2 was used.

The design of the experimental part of the study is suitable for achieving informative results. Appropriate statistical methods were used to evaluate the results. The research was conducted by the doctoral student.

The results and discussions are presented in depth and in accordance with the tasks set, which facilitates their systematization and perception. The results are presented in 44 pages grouped and illustrated with 2 tables and 19 figures. The results are discussed in the light of modern scientific literature.

The formulated 5 conclusions are a logical consequence of the results and fully correspond to the goal and objectives of the dissertation.

The dissertation contains contributions of an applied-methodological nature and contributions of a scientific-theoretical nature, which represent an original contribution to science and meet the requirements of the Act on the Development of Academic Staff in the Republic of Bulgaria. This study is the first for the Bulgarian market and Bulgarian consumers. The results of the analysis of samples for genetically modified organisms provided important information about the current state of the market and the degree of compliance of products with regulatory requirements.

Three contributions of an applied and methodological nature have been formulated: A rapid, accurate and reliable molecular genetic methodology for the detection of all GMOs permitted in the EU in a single PCR experiment has been introduced; Using the proposed methodology, the application of ready-to-use PSPs reduces the time and cost of analysis for the detection and identification of GMOs in foods, as similar systems could find application in other areas, for example in the determination of allergens; Based on the analysis and results of the survey, recommendations for improving communication and understanding about GMOs have been formulated and published.

There are three contributions of a scientific and theoretical nature: The results obtained from molecular genetic analyses demonstrate that 12% of the tested food products are positive for the presence of GMOs, but all of them are below the LOQ or content level below the threshold of 0.9% - GMO content for mandatory labeling. 88% of the samples do not contain GMOs; The overall percentage of positive samples and the level of contamination is low, but the spectrum of detected GM events is increasing, which results coincide with literature data and studies conducted in other European Union countries; Research on the presence of GMOs on the market in Bulgaria and the survey conducted among the Bulgarian population can contribute to better understanding and trust in society regarding GMOs and related issues.

Recommendations have been developed to improve communication and understanding of GMOs.

In conclusion: The topic of the dissertation is current, scientifically sound and dissertable. The main goal and tasks are formulated clearly and in accordance with the topic. The results are of an original nature and have a certain practical applicability. The presented material contains

scientific information, results of own research, analyses and assessments, which are interpreted adequately. The mastery of the applied methods and the knowledge of the scientific literature and issues by Asst Prof. Donka Nikolova Dimbareva are evident. The contributions are of an original, applied-methodological and scientific-theoretical nature.

Based on the above, I express a positive assessment of the dissertation submitted to me for review. "Genetically modified organisms in food products on the Bulgarian market. Consumer awareness and attitudes". The scientific work meets the requirements of the Act on the development of academic staff in the Republic of Bulgaria and the Regulations on the terms and conditions for acquiring scientific degrees and occupying scientific positions of the National Center of Public Health and Analyses.

I firmly believe that the scientific jury can positively evaluate the work and support the award of the scientific and educational degree "Doctor" to Asst. Prof. Donka Nikolova Dimbareva in professional field 7.1. Medicine, scientific specialty "Hygiene" for the needs of the Department of Applied Genomics and GMOs, Directorate "Analytical and Laboratory Activities" at the National Center of Public Health and Analyses.

17.04.2025

Signature: .....

/Prof. Dr. Veselka Duleva, MD/