REVIEW

of the official reviewer for the dissertation submitted by Elmira Sovetovna Ismagulova, entitled «Phytopathological assessment of introduced walnut varieties and the development of protective measures against major diseases for the southern fruit growing zone of Kazakhstan», for the degree of Doctor of Philosophy (PhD) in the educational program 8D08104 – Plant Protection and Quarantine.

№ п/п	Criteria	Eligibility (one of the options must be checked)	Justification of the official reviewer's position (comments should be italicized)
1.	The dissertation topic (as of the date of its approval) aligns with the priority areas of scientific development and/or government programs.	1.1 Compliance with priority areas of scientific development or government programs: 1. the dissertation was carried out within the framework of a project or targeted program funded from the state budget (specify the title and number of the project or program); 2. the dissertation was carried out within the framework of another government program (specify the title of the program); 3. the dissertation corresponds to a priority area of scientific development approved by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan (specify the area).	The dissertation was carried out within the framework of Budget Program 102"Grant Financing of Scientific Research", under the sub-priority "Innovative biological research to improve the productivity and resilience of plant varieties and animal breeds in agriculture". The work was conducted under the program, Grant Number AP19677936, "Investigation of the main walnut diseases and molecular genetic basis of the resistance of promising varieties to economically important pathogens". The dissertation topic corresponds to the priority areas of scientific advancement: "Ecology, environment, and sustainable resource management" and "Sustainable development of the agro-industrial complex"
2.	Significance for science	The work **makes**/does not make a significant contribution to science and its importance is **well articulated** / not articulated.	The work **makes** a significant contribution to Plant Protection and Quarantine, since it includes a phytopathological assessment of introduced walnut varieties and the development of protective measures against major diseases and its importance is **well articulated**.
3.	Principle of independence	Level of independence: 1. **high;** 2. medium; 3. low; 4. no independence.	The author demonstrated a **high** level of independence in planning and conducting field research, as well as in analyzing the obtained data.
4.	Principle of internal unity	4.1 Justification of the relevance of the dissertation: 1. **justified;** 2. partially justified;	The relevance of the dissertation work is **justified**. The walnut (*Juglans regia*) is recognized as a highly valuable food commodity.

			organoleptic properties, significant nutritional content, and established medicinal efficacy. The domestication of the walnut commenced in antiquity, resulting in the development of numerous cultivars. These cultivars exhibit considerable variation in morphological characteristics such as fruit size and shape, pericarp hardness, internal septal development, and biochemical composition, among other parameters.
		4.2 The content of the dissertation reflects the dissertation topic: 1. **reflects**; 2. partially reflects; 3. does not reflect.	The content of the dissertation fully **reflects** its topic.
		4.3 The goal and objectives correspond to the dissertation topic: 1. **correspond;** 2. partially correspond; 3. do not correspond.	The research goal and objectives **correspond** to the dissertation topic, and the objectives are logically coherent and instrumental in facilitating the realization of the primary goal.
		4.4 All sections and provisions of the dissertation are: 1. **fully interconnected;** 2. partially interconnected; 3. not interconnected.	The chapters of the dissertation are **fully logically connected** with each other and are subordinated to a common goal, the results correspond to the objectives posed, and the conclusions follow from the results obtained in the analysis of a large experimental material. Dissertational work is characterized by internal unity and is distinguished by the original author's approach to solving the objectives.
		4.5 The new solutions (principles, methods) proposed by the author are reasoned and evaluated in comparison with known solutions: 1. **a critical analysis is provided**; 2. the analysis is partial; 3. the analysis consists not of the author's own opinions, but of quotations from other authors; 4. the analysis is absent.	The author proposes new solutions (principles and methods) that are well-founded and compared to existing approaches. A comparative **critical analysis is present** both in the description of the identified fungal and bacterial species and in the assessment of the resistance of walnut cultivars.
5.	Principle of scientific novelty	5.1 Are the scientific results and statements new?	The scientific results and provisions are **completely new**,

		2. partially new (25–75% are new); 3. not new (less than 25% are new).	work is confirmed by three highly rated publications and during the approbation of the work at 3 international scientific and practical conferences. For the first time in Kazakhstan, a phytopathogenic component of walnut microbiota has been identified. Its species composition has been determined, diagnostic profiles of pathogens have been created, the resistance of varieties and genotypes to major phytopathogens has been assessed, features of genetic diversity and population structure have been established, and recommendations for the protection of walnut from diseases have been developed.
		5.2 Are the conclusions of the dissertation new? 1. **completely new**; 2. partially new (25–75% are new); 3. not new (less than 25% are new).	The conclusions of the dissertation are **completely new** and follow from the results obtained from the analysis of a large amount of experimental material.
		5.3 Are the technical, technological, economic, or managerial solutions new and justified? 1. completely new; 2. **partially new** (25–75% are new); 3. not new (less than 25% are new).	Technical, technological, economic or managerial decisions are **partially** new and justified, because walnuts have been cultivated for quite a long time.
6.	Validity of the main conclusions	All main conclusions **are** / are not based on scientifically sound evidence, or are sufficiently well substantiated (for qualitative research and study programs in the arts and humanities).	All main conclusions **are based** on compelling scientific evidence. Sufficient experimental data has been obtained to support the conclusions.
7.	Main provisions submitted for defense	It is necessary to answer the following questions for each provision separately: 7.1 Has the provision been proven? 1. proven; 2. rather proven; 3. rather not proven; 4. not proven; 5. in its current wording, it is impossible to verify whether the provision has been proven. 7.2 Is it trivial? 1. yes; 2. no;	1. As a result of monitoring surveys of plantations in the southern fruit-growing zone of Kazakhstan, the spread and development of the main fungal and bacterial pathogens of walnut were identified. The position is proven, is not trivial, is new, the level of application is average (since the applicability of the work is limited by the geography of the region), proven in a number of top-rated articles.

		impossible to verify whether the provision is trivial. 7.3 Is it new? 1. yes; 2. no; 3. in its current wording, it is impossible to verify whether the provision is novel. 7.4 Scope of application: 1. narrow; 2. medium; 3. broad; 4. in its current wording, it is impossible to verify the scope of application of the provision. 7.5 Has it been proven in the article? 1. yes; 2. no; 3. in its current wording, it is impossible to verify whether the provision has been proven in the article.	research, the causal agents of bacterial and fungal walnut diseases were identified using microbiological and molecular-genetic methods. The position is proven, is not trivial, is new, the level of application is average, and is confirmed in scientific publications. 3. The feasibility of introducing walnut varieties resistant to bacterial and fungal diseases into practical cultivation and breeding has been established, which will improve the breeding process and increase fruit yield. The position is proven, is not trivial, is new, the level of application is average, and is confirmed in scientific publications. 4. Genetic diversity and phylogenetic relationships of local and introduced walnut forms have been determined based on SNP genotyping data. The position is proven, is not trivial, is new, the level of application is average, and is confirmed in scientific publications. 5. Scientifically grounded recommendations have been developed for the protection of walnut (J. regia L.) against fungal and bacterial diseases, taking into account the agroecological conditions of the southern fruit-growing zone of Kazakhstan. The position is proven, is not trivial, is new, the level of application is average, and is confirmed in scientific publications.
8.	Principle of reliability (Reliability of sources and the information provided)	8.1 The choice of methodology is justified or the methodology is described **in sufficient detail**: **1. yes;** 2. no.	The methodology is described **in sufficient detail** and substantiated. All theoretical conclusions are supported by field and laboratory studies.
		8.2 The results of the dissertation are obtained using modern methods of scientific research and techniques for data processing and interpretation with	The results of the dissertation **are obtained** using both classical methods of mycology (obtaining fungal isolates and ma...

		the use of computer technologies: **1. yes;** 2. no.	pure cultures) and phytopathology (determination of bacterial pathogenicity and methods of testing fungicides and carrying out protective measures, economic efficiency of using modern preparations against the main diseases of walnut), and modern methods of scientific research and methods of processing and interpreting data using computer technologies (extraction of genomic DNA from samples, sequencing of ITS and 16S rRNA on a MinION Mk1B device using MinKNOW v24.06.5 software, alignment using Minimap2 v2.28, construction of a phylogenetic tree using the nearest neighbor-joining method, using the MEGA program (version 12), calculation of evolutionary distances according to the Kimura model with two parameters, analysis of population structure using ADMIXTURE PCA analysis using the SNPRelate package.
		8.3 Theoretical conclusions, models, identified relationships and patterns are proven and confirmed by experimental research (for programs in pedagogical sciences, results are confirmed based on pedagogical experiments): 1. **yes;** 2. no.	Theoretical conclusions, models, identified relationships and patterns **are proven** and confirmed by experimental research based on the Kazakh National Agrarian Research University and the Department of Plant Protection, Faculty of Agriculture, Akdeniz University (Turkey, Antalya).
		8.4 Important statements are confirmed / partially confirmed / not confirmed by references to relevant and reliable scientific literature.	Important statements **are confirmed** by references to relevant and reliable scientific literature.
		8.5 The literature sources used are sufficient / insufficient for the literature review.	The references used **are sufficient** for a literature review. The list of references includes 156 titles.
9.	Principle of practical value	9.1 The dissertation has theoretical significance: **1. yes;** 2. no.	The dissertation has **theoretical significance**, which is comprised of conducting research on the phytopathogenic complex of walnut, determining the species composition of fungal and

			diagnostic profiles of pathogens based on PCR identification of genomic DNA, assessing the resistance of varieties and genotypes to major phytopathogens, establishing the features of genetic diversity and population structure of varieties and populations based on SNP genotyping, and developing scientifically substantiated recommendations for protecting walnut plantations from diseases.
		9.2 The dissertation has practical significance and there is a high probability of applying the obtained results in practice: **1. yes;** 2. no.	The dissertation **has practical significance** for Kazakhstan's agricultural sector (phytosanitary monitoring system, database of principal pathogens, recommendations for stable varieties), yet their practical utilization is restricted owing to geographical specificities.
		9.3 The proposed practical recommendations are new: 1. completely new; 2. **partially new (25–75% are new);** 3. not new (less than 25% are new).	The proposed practical recommendations are **partially new** for the peasant farm "Manshuk" (village Turgen, Enbekshikazakh district) and TOO "Fazenda UM" (village Bereke, Talgar district, Almaty region). The implementation covers an area of 10 ha in each farm and is planned for further scaling to other farms in the region.
10.	Quality of writing and presentation	Quality of academic writing: **1. high;** 2. average; 3. below average; 4. low.	The writing quality **is generally high**, but there are occasional stylistic errors and grammatical typos. The academic style is consistent.
11.	Comments on the dissertation	1. When the species of fungi or bacteria are first mentioned, the authors who described the species are not indicated. 2. The micrographs do not indicate magnification. 3. There are some stylistic errors and grammatical typos. These comments in no way diminish the value of this dissertation.	
12.	Scientific level of the doctoral candidate's articles on the research topic (in the case of a dissertation defense in the form of a series of articles,	The doctoral student's articles demonstrate a high scientific standard, are relevant to the research topic, and reflect the key aspects of the dissertation. In articles published in peer-reviewed journals, the author provides a detailed description of the results, data analysis, and discussion of the conclusions, confirming the scientific value and novelty of the work and demonstrating a deep understanding of the problem and the ability to apply modern analytical methods. A total of 9 scientific works have been	

	comment on the scientific level of each article published by the doctoral candidate on the research topic)	journals recommended by the Committee for Control in the Sphere of Education and Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan; two articles in the proceedings of international scientific conferences; two articles were published in journals indexed in the Scopus database with percentile indicators of 65 and 88.
13.	Decision of the official reviewer (in accordance with paragraph 28 of these Standard Regulations)	The dissertation work of Elmira Sovetovna Ismagulova, entitled «Phytopathological assessment of introduced walnut varieties and the development of protective measures against major diseases for the southern fruit growing zone of Kazakhstan», for the degree of Doctor of Philosophy (PhD) in the educational program 8D08104 – Plant Protection and Quarantine, is completed at a high level, contributes to the study of Plant Protection and Quarantine, which is confirmed by publications in peer-reviewed journals, and meets the established requirements of the Rules for the award of degrees, and its author, Elmira Sovetovna Ismagulova, deserves to be awarded the sought degree of Doctor of Philosophy (PhD) in the educational program "8D08104 - Plant Protection and Quarantine".

Official Reviewer:
Chief Researcher of Mycology and Algology Laboratory, RSE "Institute of Botany and Phytointroduction" under the Committee of Forestry and Wildlife of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan, Doctor of Biological Sciences, Associate Professor

Rakhimova Yelena Vladimirovna
(signature, surname, first name, patronymic)

Signature certified, seal affixed.

Date: « 16 » April 2026

КЕҢСЕ

Қолын куәландыратын Қазақстан Республикасының Экология және табиғи ресурстар министрлігі Орман шаруашылығы және жануарлар дүниесі комитетінің "Ботаника және фитоинтродукция институты" шаруашылық жүргізу құқығындағы республикалық мемлекеттік кәсіпорны