

ISSN 2518-1467 (Online),  
ISSN 1991-3494 (Print)

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ  
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

# Х А Б А Р Ш Ы С Ы

---

---

**ВЕСТНИК**

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК  
РЕСПУБЛИКИ КАЗАХСТАН

**THE BULLETIN**

THE NATIONAL ACADEMY OF SCIENCES  
OF THE REPUBLIC OF KAZAKHSTAN

PUBLISHED SINCE 1944

1

JANUARY – FEBRUARY 2021

---

ALMATY, NAS RK

---

*NAS RK is pleased to announce that Bulletin of NAS RK scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of Bulletin of NAS RK in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential multidiscipline content to our community.*

*Қазақстан Республикасы Ұлттық ғылым академиясы "ҚР ҰҒА Хабаршысы" ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Web of Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабаршысының Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді мультидисциплинарлы контентке адалдығымызды білдіреді.*

*НАН РК сообщает, что научный журнал «Вестник НАН РК» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Вестника НАН РК в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному мультидисциплинарному контенту для нашего сообщества.*

Б а с р е д а к т о р ы  
х.ғ.д., проф., ҚР ҰҒА академигі  
**М.Ж. Жұрынов**

Р е д а к ц и я а л қ а с ы:

**Абиев Р.Ш.** проф. (Ресей)  
**Абылкасымова А.Е.** проф., академик (Қазақстан)  
**Аврамов К.В.** проф. (Украина)  
**Аппель Юрген** проф. (Германия)  
**Банас Иозеф** проф. (Польша)  
**Велесько С.** проф. (Германия)  
**Велихов Е.П.** проф., РҒА академигі (Ресей)  
**Кабульдинов З.Е.** проф. (Қазақстан)  
**Қалимолдаев М.Н.** проф., академик (Қазақстан), бас ред. орынбасары  
**Қамзабекұлы Д.** проф., академик (Қазақстан)  
**Қойгелдиев М.К.** проф., академик (Қазақстан)  
**Лупашку Ф.** проф., корр.-мүшесі (Молдова)  
**Новак Изабелла** проф. (Германия)  
**Полещук О.Х.** проф. (Ресей)  
**Поняев А.И.** проф. (Ресей)  
**Сагиян А.С.** проф., академик (Армения)  
**Таймагамбетов Ж.К.** проф., академик (Қазақстан)  
**Хрипунов Г.С.** проф. (Украина)  
**Шәукенова З.К.** проф., корр.-мүшесі (Қазақстан)  
**Юлдашбаев Ю.А.** проф., РҒА академигі (Ресей)  
**Якубова М.М.** проф., академик (Тәжікстан)

**«Қазақстан Республикасы Ұлттық ғылым академиясының Хабаршысы».**

**ISSN 2518-1467 (Online),**  
**ISSN 1991-3494 (Print)**

Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы»РҚБ (Алматы қ.).

Қазақстан Республикасының Ақпарат және коммуникациялар министрлігінің Ақпарат комитетінде  
12.02.2018 ж. берілген № **16895-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік.

**Тақырыптық бағыты: *іргелі ғылымдар саласындағы жаңа жетістіктер нәтижелерін жария ету.***

Мерзімділігі: жылына 6 рет.  
Тиражы: 2000 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., 220,  
тел.: 272-13-19, 272-13-18, <http://www.bulletin-science.kz/index.php/en/>

---

© Қазақстан Республикасының Ұлттық ғылым академиясы, 2021

Типографияның мекенжайы: «NurNaz GRACE», Алматы қ., Рысқұлов көш., 103.

Главный редактор  
д.х.н., проф. академик НАН РК  
**М.Ж. Журинов**

Редакционная коллегия:

**Абиев Р.Ш.** проф. (Россия)  
**Абылкасымова А.Е.** проф., академик (Казахстан)  
**Аврамов К.В.** проф. (Украина)  
**Аппель Юрген** проф. (Германия)  
**Банас Иозеф** проф. (Польша)  
**Велесько С.** проф. (Германия)  
**Велихов Е.П.** проф., академик РАН (Россия)  
**Кабульдинов З.Е.** проф. (Казахстан)  
**Калимолдаев М.Н.** академик (Казахстан), зам. гл. ред.  
**Камзабекулы Д.** проф., академик (Казахстан)  
**Койгельдиев М.К.** проф., академик (Казахстан)  
**Лупашку Ф.** проф., чл.-корр. (Молдова)  
**Новак Изабелла** проф. (Германия)  
**Полещук О.Х.** проф. (Россия)  
**Поняев А.И.** проф. (Россия)  
**Сагиян А.С.** проф., академик (Армения)  
**Таймагамбетов Ж.К.** проф., академик (Казахстан)  
**Хрипунов Г.С.** проф. (Украина)  
**Шаукенова З.К.** проф., чл.-корр. (Казахстан)  
**Юлдашбаев Ю.А.** проф., академик РАН (Россия)  
**Якубова М.М.** проф., академик (Таджикистан)

**«Вестник Национальной академии наук Республики Казахстан».**

**ISSN 2518-1467 (Online),  
ISSN 1991-3494 (Print)**

Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы).

Свидетельство о постановке на учет периодического печатного издания в Комитете информации Министерства информации и коммуникаций и Республики Казахстан № 16895-Ж, выданное 12.02.2018 г.

**Тематическая направленность: *публикация результатов новых достижений в области фундаментальных наук.***

Периодичность: 6 раз в год.  
Тираж: 2000 экземпляров.

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, ком. 219, 220, тел. 272-13-19, 272-13-18.  
<http://www.bulletin-science.kz/index.php/en/>

---

© Национальная академия наук Республики Казахстан, 2021

Адрес типографии: «NurNazGRACE», г. Алматы, ул. Рыскулова, 103.

Editor in chief

doctor of chemistry, professor, academician of NAS RK

**M.Zh. Zhurinov**

Editorial board:

**Abiyev R.Sh.** prof. (Russia)  
**Abylkasymova A.E.** prof., academician (Kazakhstan)  
**Avramov K.V.** prof. (Ukraine)  
**Appel Jurgen,** prof. (Germany)  
**Banas Joseph,** prof. (Poland)  
**Velesco S.,** prof. (Germany)  
**Velikhov Ye.P.** prof., academician of RAS (Russia)  
**Kabuldinov Z.E.** prof. (Kazakhstan)  
**Kalimoldayev M.N.** prof., academician (Kazakhstan), deputy editor in chief  
**Kamzabekuly D.** prof., academician (Kazakhstan)  
**Koigeldiev M.K.** prof., academician (Kazakhstan)  
**Lupashku F.** prof., corr. member (Moldova)  
**Nowak Isabella,** prof. (Germany)  
**Poleshchuk O.Kh.** prof. (Russia)  
**Ponyaev A.I.** prof. (Russia)  
**Sagiyani A.S.** prof., academician (Armenia)  
**Taimagambetov Zh.K.** prof., academician (Kazakhstan)  
**Khripunov G.S.** prof. (Ukraine)  
**Shaukenova Z.K.** prof., corr. member. (Kazakhstan)  
**Yuldashbayev Y.A.,** prof., academician of RAS (Russia)  
**Yakubova M.M.** prof., academician (Tadjikistan)

**Bulletin of the National Academy of Sciences of the Republic of Kazakhstan.**

**ISSN 2518-1467 (Online),**  
**ISSN 1991-3494 (Print)**

Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty).

The certificate of registration of a periodical printed publication in the Committee of information of the Ministry of Information and Communications of the Republic of Kazakhstan No. **16895-Ж**, issued on 12.02.2018.

**Thematic focus:** *publication of the results of new achievements in the field of basic sciences.*

Periodicity: 6 times a year.

Circulation: 2000 copies.

Editorial address: 28, Shevchenko str., of. 219, 220, Almaty, 050010, tel. 272-13-19, 272-13-18,  
<http://www.bulletin-science.kz/index.php/en/>

---

© National Academy of Sciences of the Republic of Kazakhstan, 2021

Address of printing house: «NurNaz GRACE», 103, Ryskulov str, Almaty.

**G. Babaeva<sup>1</sup>, N. Salybekova<sup>1</sup>, A. Serzhanova<sup>1</sup>, Esin Basim<sup>2</sup>**

<sup>1</sup> Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan;

<sup>2</sup>Organic Agricultural Department, Technical Science Vocational School, Akdeniz University, Antalya, Turkey.

E-mail: gturmetova@bk.ru, s\_nurdana@mail.ru, aikerim\_s@mail.ru

**BIOLOGICAL FEATURES OF SPECIES  
OF PHYTOPATHOLOGICAL FUNGI AFFECTING TOMATOES  
(LYCOPERSICON ESCULENTUM MILL.)  
IN THE SOUTHERN REGION OF KAZAKHSTAN**

**Abstract.** The article considers studies designed to justify the types of pathogens of tomatoes that occur during vegetation and storage, and measures to combat them. The work was carried out in 2019 on a land plot near the rural districts of Babaykorgan, Zhuynek, and Issa of the Turkestan region. As it became known, the growth period of vegetable seedlings depends on the temperature of the soil. In our experience, the seed material was planted in the open ground in early April. The soil was very hot and moist. Depending on the culture and varietal characteristics, the sprouts appeared on 6-15 days after sowing. The results of phytopathological control showed that various varieties of all types of tomatoes were affected by phytopathogenic microorganisms. During the growing season, the most dangerous disease in tomato fruit was apical rot of the fruit, which led to a significant decrease in the yield. The leaves are widely developed early blight and verticillium. Late blight at the end of the growing season was observed in full on both leaves and fruits (developed during fruit storage). When growing tomato crops at two sites was dominated by late blight, early blight, verticillium, viral diseases and apical rot. Based on the results of phytopathological control, it can be concluded that the number of fungal diseases prevailed in plot 1, which is associated with frequent irrigation on this site, its shading and a large number of fruits on plants. Viral diseases prevailed in plot 2, which is explained by weeds clogging the plot.

**Key words:** phytopathology, fungi, tomatoes, pathogens, vegetation, microorganisms, morphology, microscopy, mycelium, lesions.

**Introduction.** Tomatoes are one of the main vegetable crops in Kazakhstan. It is successfully grown in Africa and America, Canada and Japan, in Central Asia and Northern Europe.

This is due to the high environmental efficiency and productivity of the crop, good taste properties of the fruit. Tomato is one of the main sources of raw materials for industrial drying of the country. Tomato belongs to the genus *Lycopersicon* Tourn of the Solanaceae family. The main representative is the common tomato *Lycopersicon esculentum* Mill., which occupies an important place in the genus.

During the growing season, the plant is in direct connection with the environment. Its growth and development necessarily depends on the temperature, humidity, chemical composition of the soil and other various factors.

If the state of the environment meets the necessary requirements of the plant, then morphological and functional changes are not observed. In any change in the stable state of the environment, other extraneous organisms can affect the plant, disrupt the metabolism and physiological features, change the anatomical structure and appearance of the plant, which can lead to its disease.

Plant disease is a very complex pathological process. The main place among pathogens of diseases in plants is occupied by phytopathogenic fungi. Currently, many studies are being conducted in different regions that characterize the bioecological features of the species composition of imperfect fungi [1]. The yield of tomatoes has also significantly decreased due to various diseases.

**Main part.** The city of Turkestan, with a total area of 9.4 thousand square kilometers, is located in the center of the Turkestan region. In the East it borders with the historical Otrar, in the North with the city of Kentau and the Suzak district, in the West with the Zhanakorgan district of the Kyzylorda region.

The Turkestan region includes diversified agriculture. In General, the district has 156,000 hectares, including 47780 hectares of irrigated land, and 280000 hectares of land are reserved. Currently, 43700 ha of land is used.

In the district, along with crops, currently, thanks to financial support from the state (subsidies), most of the population is focused on vegetable growing (table1).

Table 1 - Information about the acreage of Turkestan district for 2019, ha

№	rural county	Areas of irrigated land	Area of crops	Vegetables
1	Babaykurgan	2421	2100	90
2	Juynek	4260	3950	300
3	Yassy	2435	2200	140
4	Karashik	4267	3950	450
5	Sauran	1841	1150	110
6	New Ikan	4534	4100	210
7	Old Ikan	10452	10050	500
8	Orangay	2217	2100	420
9	Shaga	5016	4800	340
10	Shornak	4653	4150	250
11	Ushkayik	3594	3050	150
12	Zhibekzholy	2090	1400	100
13	Turkestan city		700	350
	Total:	47780	43700	3410

**Objects and methods of research.** The research work is intended to substantiate the types of pathogens of tomatoes that occur during vegetation and storage, and measures to combat them.

The work was carried out in 2019 on a land plot near the rural districts of Babaykorgan, Zhuynek, and Issa of the Turkestan region.

The determination of plant pathogens was based on the determinants of these groups of phytopathogens [2-8].

The material collected in the field for the determination of microorganisms was studied in the laboratory. Studies that cannot be performed in the field (determination of microbial species, analysis with determinants, analysis of morphological features, etc.) were performed in the laboratory. A herbarium made of damaged plants, preserved and freshly damaged material was used. When getting acquainted with plant pathogens, microscopic analysis is required. To make a microscopic preparation, you must have the following materials and tools: a surgical knife (scalpel), two-pair needles, a pipette, a razor (or a safety razor blade), a pipette with water, alcohol candles, cover and slide glasses.

Microscopic preparation is done in various ways, depending on the material under study. Using a magnifying glass, the infected plant or part of it is examined, the presence of spores is determined and in what form they are [9-12].

If the spores of the pathogen are on the plant surface in the form of mold or powder, then pull out a surgical knife or a pair of needles and transfer to a drop of water on a slide. In the water on the slide, the pest seeds are easily spread out and then the cover glass is carefully applied so that there are no air bubbles left. In this form, this drug is examined under a microscope. Preparation of the drug in this way is used only if the pest spores are on the surface of the affected organ.

If harmful spores are inside the plant tissue or are absent, then it is necessary to determine the disease of the plant, for example, if the plant tissue begins to rot, then you need to consider the affected plant tissue under a microscope. In this case, two methods of preparation of the drug are used. According to the first method, part of the affected tissue is cut out and placed in a drop of water on a slide, then the tissue is divided into parts with a surgical scalpel or needles, after which the top is covered with a cover glass [13-15].

From such a preparation, pycnids will be visible under the microscope, in which spores and fruit bodies are located, which are released from the tissues or seed body of colorless or colored filamentous

fungi in the form of a mass of small turbid particles. When studying the sexual spores of lower fungi, such as oospores (perenosporos), located deep in plant tissue, for the preparation of the drug, you should not use water, but lactic acid, since it discolors the tissue. These drugs are heated to get rid of air bubbles. The second method of preparation of the drug is cutting tissue with a razor. The technique of preparing a piece is varied and depends on the material being studied. Cutting out a leaf or other soft part of the plant is carried out as follows.

Sometimes, when studying fungal diseases, it is necessary to paint over the affected tissue. Here, the method of using the color of a living object and color during pre-fixation is applied. The N.A.Naumov method is used for staining live fungi (mycelium, conidiophores, spores). To do this, without pre-treatment of the affected part of the leaf, use a cotton-gauze swab soaked in 1% solution of water or lactic acid aniline blue. The staining time is from a few seconds to 1-3 minutes. During the staining process, the spores, conidia, and mycelium in the affected tissue turn blue, and the healthy tissue remains unpainted [16-17].

The colored affected part of the leaf can be viewed with a microscope at a small magnification.

A cotton-gauze blue swab (soaked in 1% water or lactic acid solution) can be used to color the selected object. The easiest way to select (cut) an object is to heat it in a drop of water or lactic acid on a slide. Then 1-2 drops of paint are dropped on the cut. Usually the cut-off point is well painted in 5-10 seconds. Spores and mycelium are stained more intensely than plant tissue.

This method of coloring is used when fungi of the genus perenosporos are affected: in particular, to determine the pathogens of the keel disease (the material is covered on a slide).

Cultivation of microscopic fungi, depending on the method and purpose of the study, includes the following levels:

- Production of these types of natural substrates (affected organs and seeds of plants, etc.), planned for planting in elective (selected) and simple (Chapek agars) nutrient media that provide special development of one species or genus, group of species; determination of the presence of fungi.

- Receiving and allocation of pure culture of fungi in agar nutrient media.

Methods of pure culture. Take a pure culture of mushrooms and conduct in vitro observations. The color of a pure culture will provide an opportunity to determine the nature of their growth and sporulation in fungi, especially morphogenesis, to determine the types of fruiting bodies, and spores formed, to determine the relation of fungi to environmental factors (temperature, humidity, lighting engineering, acidity), to radiation, to the composition of the cover (substrate) to determine the biosynthetic activity of metabolic products of fungi (enzymes, growth regulators, vitamins), to determine the relationship of fungi to fungicides to drugs., to make the comparative characteristics of the isolates of fungi, conduct population studies, determine the relationship of fungi with each other, characterize the degree of parasitism, describe the relationship between fungi, etc.

**Results of experimental researches.** Germination - an indicator that characterizes the quality of the seed material. As it became known, the growth period of vegetable seedlings depends on the temperature of the soil. In our experience, the seed material was planted in the open ground in early April. The soil was very hot and moist. Depending on the culture and varietal characteristics, the sprouts appeared on 6-15 days after sowing (table 2-3).

Table 2 - Biometric indicators of tomatoes in the growing season (Rural district Juynec)

Growing	breed	Stem length, cm.	The number of shoots, PCs.	Number of leaves		Assimilation surface, cm <sup>2</sup>	
				1 sprout, pieces	plant, pieces	1 leaf	plant
Growth period – growth of vegetative mass							
tomato	Gloria	17,1±1,8	1	5,3	5,3	9,3	49,3
	Table tomato	8,5±1,8	1	4,7	4,7	9,9	46,5
The periods of budding and flowering							
tomato	Gloria	33,5±8,5	2,2	9,0	19,8	14,7	291,1
	Table tomato	27,3±7,7	2,7	7,6	20,6	15,8	325,5



Table 3 - Biometric indicators of tomatoes in the growing season (Babaykurgan field plot)

Growing	breed	Stem length, cm.	The number of shoots, PCs.	Number of leaves		Assimilation surface, cm <sup>2</sup>	
				1 sprout, pieces	plant, pieces		
Growth period – growth of vegetative mass							
tomato	Novichok	17,1±1,8	1	5,3	5,3	9,3	49,3
	Rio-grande	8,5±1,8	1	4,7	4,7	9,9	46,5
The periods of budding and flowering							
tomato	Novichok	33,5±8,5	2,2	9,0	19,8	14,7	291,1
	Rio-grande	27,3±7,7	2,7	7,6	20,6	15,8	325,5

As can be seen from Table-3, biometric analysis was performed for plant growth indicators and indicators that characterize plant growth. According to the table at the beginning of the growing season the indicators of the Novichok variety were high.

During the period of active growth of the vegetative mass, during the period of seedlings, every 3-4 days, the soil was loosened. The emergence of plant diseases was observed on leaves and sprouts. Since the tomato crop was planted in the open ground, yellowing and color change of the lower leaves was observed. There was also constant monitoring of the appearance of diseases and the formation of tomato fruits, and chemical treatment was not carried out. Thus, according to the methods described above, observations were made in all regions. According to the purpose of our study, the main and constant attention was paid to determining the resistance of tomatoes to diseases (figure 1).



Figure 1- Bacterial disease of apical rot of the Novichok breed

Table 4 - Defeat of tomato breeds by types of diseases (Babaykurgan field plot)

Growing	Breed	Spread of diseases/development, %				
		Viral disease	late blight	Alternaria blight	verticillium	Apical rot
25 July 2019						
tomato	Novichok	13,3/2,7	13,3/2,7	26,7/5,3	6,7/1,3	-
	Rio-grande	20,0/4,0	6,7/1,3	33,3/6,7	6,7/1,3	-
7 August 2019						
Tomato	Novichok	20,0/4,0	-	33,3/9,3	26,7/6,7	46,7/13,3
	Rio-grande	20,0/5,3	-	33,3/10,7	13,3/2,7	100/53,3
27 September 2019						
tomato	Novichok	46,7/17,3	60,0/16,0	46,7/17,3	66,7/25,3	-
	Rio-grande	53,3/20,0	53,3/13,3	53,3/20,0	33,3/17,3	-

Resistance of vegetable crops to diseases is one of the most important characteristics of the variety. The quality of vegetable products depends on this. Phytopathological analysis of vegetable plants revealed viral, bacterial and fungal diseases. As can be seen from table 7, the varieties of vegetable crops studied affect both viral and fungal diseases. During the growing season until the second half of August, hot and dry weather prevailed, so in early August there was a high degree table-4 defeat of tomato varieties by types of diseases.

On July 25, 2019, diseases of tomato microorganisms were detected at the Babaykurgan field plot: late blight, alternariosis and verticilliosis (table 5). The highest degree of infection with viral diseases, alternariosis was the Rio Grande variety (the ratio of prevalence for viral diseases – 20.0/4.0%, alternariosis-33.3/2.7), and late blight - the Novichok variety (13.3/2.7%). Both varieties are equally damaged by verticilliosis (6.7/1.3%). On August 7, 2019, tomatoes were affected by viral diseases, alternariosis, verticilliosis and apical rot (figure 2-3).

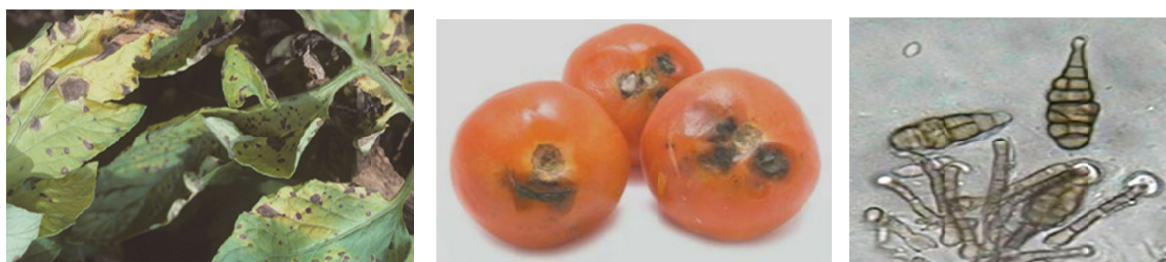


Figure 2 - Type of disease Alternariosis and conidia *Alternaria alternate*

Viral diseases (20/5, 3%), alternariosis (33.3/10.7%) and high rottenness (100/53,3) – the Rio Grande variety was the most exposed, as well as equal prevalence of viral diseases and alternariosis (20 and 33.3%, respectively). Verticillium (26,7/6,7%) severely damaged the grade Novichok (26,7/6.7 percent). On September 27, 2018, tomato plants were subjected to viral diseases, late blight, alternariosis and verticilliosis. Viral diseases (53.3/20.0%) and alternariosis (53.3/20%) prevailed in Rio Grande tomatoes, while late blight (60.0/16.0) and verticilliosis (66.7/25.3%) prevailed in Novichok breeds.

Table 5 - Defeat viral diseases varieties of tomatoes (village Karachik)

Growing	Breed	Spread of diseases/development, %				
		Lamination	Wrinkled mosaic	Striped mosaic	Leaf roll	The twisting of the leaves
21 July 2019						
tomato	Junior	6,7/1,3	13,3/2,7	-	6,7/1,3	6,7/1,3
	Avrora	13,3/2,7	20,0/5,3	-	6,7/2,7	-
1 August 2019						
tomato	Junior	20,0/4,0	13,3/2,7	13,3/2,7	13,3/2,7	13,3/2,7
	Avrora	20,0/6,7	20,0/6,7	-	20,0/5,3	13,3/2,7
29 September 2019						
Tomat	Junior	33,3/13,3	20,0/4,0	20,0/5,3	26,7/6,7	20,0/4,0
	Avrora	40,0/17,3	33,3/9,3	6,7/1,3	26,7/8,0	26,7/8,0

As can be seen from table 8, on July 21, 2019, it was found that the leaves of tomatoes are twisted, which means they are susceptible to viral diseases. Leaf twisting was mainly observed in the Aurora variety (26.7 / 8.0%), and leaf twisting virus (20.0/8.0%) was observed in tomatoes of the Junior variety.

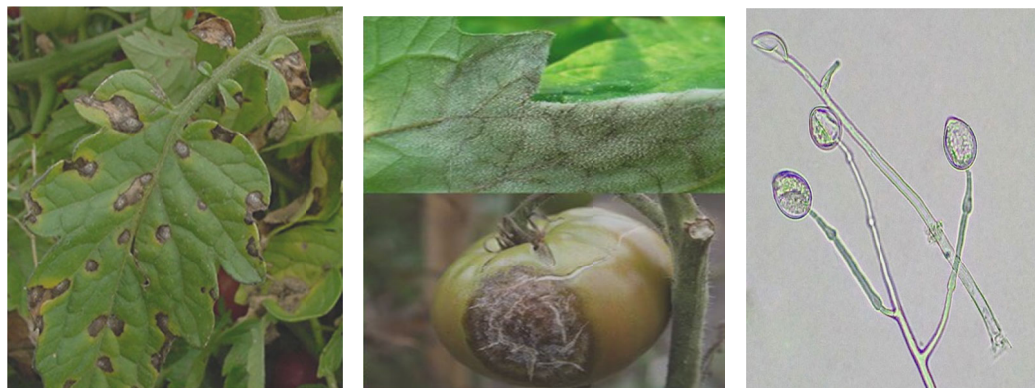


Figure 3 - Type of disease Alternariosis and conidia *Alternaria alternate*

As can be seen from table 8, on July 21, 2019, it was found that the leaves of tomatoes are twisted, which means they are susceptible to viral diseases. Leaf twisting was mainly observed in the Aurora variety (26.7 / 8.0%), and leaf twisting virus (20.0/8.0%) was observed in tomatoes of the Junior variety.

The results of phytopathological control showed that various varieties of all types of tomatoes were affected by phytopathogenic microorganisms. During the growing season, the most dangerous disease in tomato fruit was apical rot of the fruit, which led to a significant decrease in the yield. The leaves are widely developed early blight and verticillium. Late blight at the end of the growing season was observed in full on both leaves and fruits (developed during fruit storage). When growing tomato crops at two sites was dominated by late blight, early blight, verticillium, viral diseases and apical rot. On the No. 1 site was dominated by late blight (the disease on 29 September 2019-16.0% by grade Beginner and 13.3% grade Junior), *Alternaria* (17.3% of the class Beginner and 20.0% of the variety Rio Grande) and verticillium. In section 2, viral diseases of tomatoes prevailed (an increase in the incidence on September 29, 2010-25.3% of the Novichok variety) and high rotteness (17.3% in the Rio Grande variety and 60.0% in the Novichok variety).

The use of new technologies, fertilizers, biologics, plant varieties, and other agromerical measures to increase crop yields and the quality of the resulting products in many ways requires additional labor costs, the use of material and monetary resources, a large number of technological means of mass production or their replacement with new ones, improving the professional staff of specialists, performers, and so on. This necessitates an economic assessment of the measures and their organizational justification [18].

Г. Бабаева<sup>1</sup>, Н.Салыбекова<sup>1</sup>, А. Сержанова<sup>1</sup>, Есин Басым<sup>2</sup>

<sup>1</sup>Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университеті, Түркістан, Қазақстан;

<sup>2</sup>Органикалық ауыл шаруашылығы кафедрасы, Ақдениз университетінің кәсіптік техникалық ғылымдар мектебі, Анталия, Түркия

### ҚАЗАҚСТАННЫҢ ОҢТҮСТІК АЙМАҒЫНДА ҚЫЗАНАҚҚА ЗИЯН КЕЛТІРЕТІН ФИТОПАТОЛОГИЯЛЫҚ САҢЫРАУҚҰЛАҚ ТҮРЛЕРІНІҢ БИОЛОГИЯЛЫҚ ЕРЕКШЕЛІКТЕРІ

**Аннотация.** Мақала вегетация және сақтау барысында пайда болатын қызанақ ауруын қоздырғыштардың биоэкологиялық ерекшеліктерін зерттеуге және оған қарсы күресу шараларын қарастырады. Жұмыс 2019 жылы Түркістан ауданының Бабайқорған, Жүйнек, Иассы ауылдық округтері маңындағы жер учаскесінде жүргізілді. Белгілі болғандай, көкөніс дақылдарының өсу кезеңі топырақ температурасына байланысты. Біздің тәжірибеміз бойынша тұқымдық материал сәуір айының басында ашық топырақта отырғызылды. Топырақ өте қызған және ылғалданған жағдайда жүргізілді. Дақылға және сорттық ерекшеліктеріне байланысты өскін егуден кейін 6-15 тәулікте пайда болды. Фитопатологиялық бақылау нәтижелері қызанақ түрлерінің түрлі сорттары фитопатогенді микроорганизмдермен зақымданғанын көрсетті. Қауіпті ауру қызанақ жемістерін де шірітіп, өнімді айтарлықтай азайтты. Жапырақтарда альтернариоз және вертициллез кең дамыды. Фитопатологиялық бақылау нәтижелері бойынша №1 учаскеде

саңырауқұлақ ауруының басым екендігі туралы қорытынды жасауға болады, бұл аталған учаскеде жиі суару, оның көлеңкеленуі және өсімдіктердегі жеміс мөлшерінің көптігіне байланысты. №2 учаскеде вирус ауруы басым болды, бұл учаскенің арамшөптермен ластану жағдайы арқылы түсіндіріледі.

**Түйін сөздер:** фитопатология, саңырауқұлақ, қызанақ, ауру қоздырғышы, вегетация, микроорганизм, морфология, микроскопия, жіпшумақ, зақымдану.

Г. Бабаева<sup>1</sup>, Н.Салыбекова<sup>1</sup>, А. Сержанова<sup>1</sup>, Есин Басым<sup>2</sup>

<sup>1</sup>Международный казахско-турецкий университет имени Ходжи Ахмеда Ясави,  
Туркестан, Казахстан;

<sup>2</sup>Кафедра Органического Сельского Хозяйства, Школа Профессиональных  
Технических Наук Университета Акдениз, Анталия, Турция

### **БИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ВИДОВ ФИТОПАТОЛОГИЧЕСКИХ ГРИБОВ, ПОРАЖАЮЩИХ ТОМАТЫ (*LYCOPERSICON ESCULENTUM* MILL.) В ЮЖНОМ РЕГИОНЕ КАЗАХСТАНА**

**Аннотация.** В статье рассматриваются исследования, направленные на обоснование видов возбудителей болезней томатов, возникающих в период вегетации и хранения, и мероприятий по борьбе с ними. Работы проводились в 2019 году на земельном участке вблизи сельских округов Бабайкорган, Жуйнек и Исса Туркестанской области. Как стало известно, период роста овощной рассады зависит от температуры почвы. По нашему опыту, семенной материал высаживали в открытый грунт в начале апреля. Почва была очень горячей и влажной. В зависимости от культуры и сортовых особенностей всходы появлялись на 6-15 день после посева. Результаты фитопатологического контроля показали, что различные сорта всех видов томатов были поражены фитопатогенными микроорганизмами. В течение вегетационного периода наиболее опасным заболеванием плодов томата была апикальная гниль плодов, которая приводила к значительному снижению урожая. Листья широко развиты ранним фитофторозом и вертициллой. Фитофтороз в конце вегетации наблюдался в полном объеме как на листьях, так и на плодах (развивался при хранении плодов). При выращивании томатных культур на двух участках преобладали фитофтороз, ранний фитофтороз, вертициллез, вирусные заболевания и апикальная гниль. На основании результатов фитопатологического контроля можно сделать вывод, что количество грибковых заболеваний преобладало на участке 1, что связано с частым поливом на этом участке, его затенением и большим количеством плодов на растениях. На участке 2 преобладали вирусные заболевания, что объясняется засорением участка сорняками.

**Ключевые слова:** фитопатология, грибы, томаты, возбудители болезней, вегетация, микроорганизмы, морфология, микроскопия, мицелии, поражения.

#### **Information about the authors:**

Babaeva Gulmira, The International Kazakh-Turkish University. Turkestan city. senior lecturer. email: gturmetova@bk.ru, <https://orcid.org/0000-0003-2709-0010>;

Salybekova Nurdana, The International Kazakh-Turkish University. Turkestan city. PhD. email: s\_nurdana@mail.ru, <https://orcid.org/0000-0002-3750-1023>;

Serzhanova Aikerim, The International Kazakh-Turkish University. Turkestan city. senior lecturer. email: aikerim\_s@mail.ru, <https://orcid.org/0000-0002-0450-6143>;

Esin Basim, Organic Agricultural Department, Technical Science Vocational School, Akdeniz University, Antalya, Turkey, <https://orcid.org/0000-0001-9188-6609>

#### **REFERENCES**

[1] Khmel'nitskaya I.I., Vepriskaya I.G., Arinbasarova M.U., Velikanov L.L. (2003) Mycology and Phytopathology, Est. 3. p. 58-63.

[2] Golikov N.N. (2003) Plant Protection and quarantine. №3. p.44.

[3] Bilay B.I. (1988) Micooganismy vosbuditeli bolesney rastenii. [Text]/ Bilay B.I., R.I. Gvozdyak, I.G. Scripal, V.G. Krayev. Kiev: Naukova dumka, 324 c.

[4] Pidoplichko N. M. (1977) Griby - parasites kulturnih rastenii. Opredelitel v 3 tomah 3 т [Text]: spravochnoe posobyе / N. M. Pidoplichko. Kiev: Naukova dumka, T. 1. 296 c.

[5] Pidoplichko N. M. (1977) Griby - parasites kulturnih rastenii. Opredelitel v 3 tomah 3 т [Text]: spravochnoe posobyе / N. M. Pidoplichko. Kiev: Naukova dumka, T. 2. 298 c.

- [6] Pidoplichko N. M. (1971) Atlas mukoralnih gribov [Text]: spravocnoe posoby / N. M. Pidoplichko. Kiev: Naukova dumka, 115 p.
- [7] Satton D. (2001) Opredelelitel patogennih i uslovno patogennih grybov [Text]: spravocnoe posoby / D. Satton, A. Fotergill, M. Rinaldi. M.: World, 2001. 461 c.
- [8] Hohryakov M. K. (1984) Opredelelitel bolesney selhoz kultur [Text]: spravocnoe posoby / M. K. Hohryakov, B. I. Potlaychuk, A. Y. Semenov, A. Y. Elbakiyan. L.: Kolos, 304 c.
- [9] Hohryakov M. K. (2003) Opredelelitel bolesney rastenii [Text]: spravocnoe posoby / M. K. Hohryakov, T. L. Dobrozrakova, K. M. Stepanov, M. F. Letova. M.: Lan, 592 c.
- [10] Cagitov A.O., Nasarbekova M.H., Karbosoba P.D. (1992) «Fytopatologiya», Almaty, p. 4-7.
- [11] Salybekova N., Basim E., Basim H., Turmetova G. (2019) Characterization of *Alternaria brassicae* causing black leaf spot disease of cabbage (*Brassica oleracea var. capitata*) in the southern part of Kazakhstan //Acta Sci. Pol. Hortorum Cultus, 18(4) 2019, 3–13. ISSN 1644-0692 e-ISSN 2545-1405
- [12] Abdimalip N., et al (2015) Salinization of Construction Materials and Way Prevention of this Process Bulletin of the National Academy of Sciences of the Republic of Kazakhstan Issue: 6 Pages:110-113.
- [13] Toychibekova G., et al (2015) The effect of Industrial Wastes of Ecotoxicants in the Soil System Bulletin of National Academy of Sciences of the Republic of Kazakhstan ISSN 1991-3494 Volume 2, Number 354, 167–171.
- [14] Toychibekova G., et al (2016) Physical and Chemical Properties of the Studied Soils of the Turkestan Region Bulletin of the National Academy of Sciences of the Republic of Kazakhstan of Issue: 2 Pages: 39-43.
- [15] Bostanova A., Toychibekova G., et al (2017) Influence of climatic conditions on the development and growth of grain and legume seeds Bulletin of the National Academy of Sciences of the Republic of Kazakhstan Issue: 2. Pages: 95-99.
- [16] Salybekova N., Abdrassulov Zh.T., Childibayev J.B., Kurmanbaeva M.S., Ramzanova A.A., Bazargaliyeva A.A. (2016) Biological and Ecological Features of the Fungus *Cladosporium Herbarum* Research Journal of Pharmaceutical, Biological and Chemical Sciences. India. № 7(1). Pages 2075-2083.
- [17] Salybekova N., Kuzhantaeva Zh.Zh., Basim E., Toychibekova G.B., Issayev G.I., Abdimalipuly A.N. (2015) *Daucus carota* L. the excitant fungi's specie's biological features Indian Journal of Science and Technology India. 8(29). Pages 1-5.
- [18] Abdimalip N.A., Toychibekova G.B. and oth. (2015) Salinization of construction materials and way prevention of this process Bulletin of the national academy of sciences of the Republic of Kazakhstan Issue: 6 Pages:110-113, Published: 2015.

МАЗМҰНЫ – СОДЕРЖАНИЕ – CONTENTS

Ғылыми мақалалар – Научные статьи – Scientific articles

<i>Zhao Y., Myrzakhmet A., Mashekova A., EYK Ng., Mukhmetov O.</i> 3D numerical study of temperature patterns in a female breast with tumor using a realistic multi-layered model.....	6
<i>Suleimen A.A., Kashaganova G.B., Issayeva G.B., Absatarova B.R., Ibraev M.C.</i> Optimization of management of urban lights with the use of neural networks.....	14
<i>Alimardanova M.K., Khamzina Zh.B., Balpanova D.T.</i> Kazakhstan zeolites as a perspective material in the water treatment of the dairy industry.....	18
<i>Atshabar B., Nurtazhin S.T., Shevtsov A., Ramankulov E.M., Sayakova Z., Rysbekova A., Stenseth N.C., Utepova I.B., Sadvovskaya V.P., Abdirasilova A.A., Begimbaeva E.Z., Abdel Z.Z.</i> Populations of the major carrier <i>Rhombomys opimus</i> , vectors of <i>Xenopsylla</i> fleas and the causative agent of <i>Yersinia pestis</i> in the Central Asian desert natural focus of plague.....	26
<i>Abdimutalip N.A., Tulpan Zh., Gul K.</i> Study of the influence of bioregulators on the productivity and development of plants grown by hydroponics.....	35
<i>Babaeva G., Salybekova N., Serzhanova A., Esin Basim.</i> Biological features of species of phytopathological fungi affecting tomatoes ( <i>Lycopersicon esculentum</i> Mill.) in the Southern region of Kazakhstan.....	42
<i>Madenova A.K., Galymbek K., Kokhmetova A.M., Atishova M.N., Bakirov S.B., Keishilov Zh.S.</i> Searching for resistance sources to wheat common bunt ( <i>Tilletia caries</i> (DC.).....	50
<i>Sayakova Z.Z., Shevtsov A.B., Atshabar B.B., Ryspekova A., Kuznetsov A.N., Sadvovskaya V.P., Ramankulov E.M., Nurtazin S. T., Abdirasilova A.A., Yeszhanov A.B.</i> Morphological and genotypic features of the populations of fleas of the genus <i>Xenopsylla</i> glinkiewicz, 1907 (Siphonaptera, Pulicidae) from the autonomous foci of the Central Asian natural desert plague focus.....	58
<i>Toychibekova G.B., Kaldybaeva A., Gul K.</i> Research of growth, development and productive processes of plants grown in biocontainers.....	76
<i>Dobromyslova I.A., Sazanova A.A., Semenov V.G., Tuleubayev Zh., Yesimbekova Z.T., Ziyaeva G.</i> Plant growth and biological productivity after processing with microelements.....	74
<i>Semenov V.G., Baimukanov D.A., Alentayev A.S., Kirillov N.K., Karynbayev A.K., Aldyakov A.V.</i> Factors of nonspecific resistance of calves in dairy cattle breeding.....	81
<i>Prysiazhniuk L.M., Honcharov Yu.O., Shytikova Yu.V., Melnyk S.I.</i> Assessment of maize grain quality by DNA markers....	89
<i>Baltabayeva A.Yu., Abubakirova A., Syzdykova A.O.</i> Importance of the Silk road and the Silk road economic belt project.....	96
<i>Imrani Z.T., Musaveya M.R., Orucov P.Sh.</i> The geopolitical position of the turkic world and the geography of transport and economic relationships.....	104
<i>Kenenbayev S., Djura Karagic, Yessenbayeva G.</i> Climate change and priority research areas in agriculture.....	111
<i>Agumbayeva A.E., Gabdualieva R.S., Tulegenova A.U., Kurmantaeva B.K., Tlesova J.A., Abuova J.U.</i> Labor market under the conditions of the global pandemia.....	117
<i>Бекенова Л., Велеско С.</i> Саланың бәсекеге қабілеттілігі: шарттары мен факторлары .....	123
<i>(Bekenova L., Velesko S.</i> Competitiveness of the industry: conditions and factors)	
<i>Belgibayeva A.S., Ashimova I.D., Zakirova M.S., Sabikenov S.N.</i> Quantitative characteristics of labor potential in agricultural sector of Akmola region.....	131
<i>Vovk V. Y., Zhezherun Yu.V., Kostohryz V.G., Maliarova V. O.</i> Development of the banking sector of Ukraine in the space of formation of destructive consequences of the influence of the global financial and economic crises: economic and legal aspects.....	137
<i>Rudyk N.V., Niyazbekova Sh.U., Viliguta O.F., Dzholdosheva T.Yu., Kaldenova G.S., Zhanabayeva Zh.</i> Digitalization as an engine of economic growth.....	146
<i>Knazieva O.A., Kuznietsova O.V., Chesnokova N.V.</i> Problems of information and communication technologies during the formation of the digital economy and society.....	153
<i>Kraievskiy V.M., Okhrimenko I.V., Skoryk M.O., Lysiuk A.V., Hmyrya V. P.</i> Analytical tools in ensuring the convergence of accounting and information systems.....	163
<i>Maisigova L.A., Niyazbekova Sh. U., Karpenko O.A., Aimakova G., Moldashbayeva L., Amanova G.</i> Health performance audit.....	170
<i>Mussayeva D.M., Yessentay A.</i> The role and place of science in the technological and socio-economic development of countries with different scientific potential.....	178
<i>Nikitina M., Sviridov O., Lunyakov O., Naumenko R., Miran'kov D., Niyazbekova Sh., Soldatov M.</i> Gravitation equality as basis of the state's economic development algorithm in the context of forming of the independent balanced economic policy.....	187
<i>Shoshanov S.B., Makhhanov S. S., Salykova L. N.</i> Organization of refined products sales in Kazakhstan.....	194
<i>Chikibayeva Z.N., Shalbolova U.Zh.</i> Methodology for evaluating the effectiveness of investments in the expansion of university housing infrastructure.....	202
<i>Солтангазинов А. Р., Серикбаева Б. М., Амирова М. А., Кунязова С. К., Байандин М. А., Кайдарова Л. К.</i> Состояние и перспективы экономики сельских территорий Павлодарской области в контексте устойчивого развития.....	208
<i>(Soltangazinov A.R., Serikbayeva B.M., Amirova M.A., Kunjazova S.K., Bayandin M.A., Kaidarova L.K.</i> The state and prospects of the economy of rural areas of Pavlodar region in the context of sustainable development)	



<i>Beketova K.N., Abdimomynova A.Sh.</i> Corporate social responsibility and prospects for social project management of enterprises .....	219
<i>Budikova A., Kamalova N.</i> Research in engineering-geological characteristics of forest soils of the city of Kyzylorda.....	226
<i>Nurgaliyeva A., Zeinullina A., Nurbayeva G., Serekbayeva B., Bolsynbekova G.</i> Evaluating the effectiveness of using financial resources aimed at innovative industrialization.....	231
<i>Satymbekova K., Imanbayeva Z., Zhumagalieva B., Nurmaganbetova B., Basshieva Zh.</i> Main problems of working capital organization and management in the company.....	238
<i>Arabaev R., Berenalieva A.</i> Jogorku kenesh and political parties of Kyrgyzstan: interaction in parliamentary form of government.....	246
<i>Rakhmonkulova N. Kh.-A., Bakhadirova Sh. B.</i> International and national legal guarantees for investment activities in Uzbekistan.....	252
<i>Nesterov A.Y.</i> Social and legal prevention of crimes and offenses of orphans in boarding schools: on the example of the Kemerovo region.....	260
<i>Osmonalieva N. Zh., Atabekov K., Osmonalieva A.Zh.</i> Improving the legislation of the Kyrgyz Republic on orphans and children deprived of parental care .....	271
<i>Seitakhmetova N.L., Kussainov D.U., Ayupova Z.K.</i> Some features of muslim law: new trends in its development.....	278
<i>Zhylkichieva K.S., Kalybaeva A.A., Koshokova G.Zh.</i> Civil legal nature of relations between legal entity and its founders.....	284
<i>Sarkulova M.S., Amen A.Zh., Sarkulova G.S.</i> Search for practical and theoretical solutions to the problems of multiculturalism in Kazakhstan.....	290
<i>Rizakhoyeva G. A., Akeshova M.M., Shaikhystamova M.B., Jabbarova S.</i> Formation of creative potential of students based on innovative approaches.....	297
<i>Mun M.V., Berdibayeva S.K., Sakhiyeva F.A., Dossanova S.S., Kabakova M.P., Prasetyawan Dayat, Berdibayev S.K.</i> Cognitive style "Rigidity-flexibility of cognitive control" and the level intelligence indicators.....	306
<i>Mamyshева E.P., Yuyukina L.V.</i> Contribution of K.K. Samrin to the formation of the Khakass writing system (in 1920-1930-s).....	316
<i>Kaztuganova A.Zh., Omarova A.K., Stamgazyev R.U., Karomat D.F., Nurbaeva D.A.</i> Ethnomusic, ethnophore, ethnographer.....	322

#### Ғалымды еске алу – Памяти ученых – Memory of scientists

Козин Леонид Фомич .....	330
--------------------------	-----

## **Publication Ethics and Publication Malpractice in the journals of the National Academy of Sciences of the Republic of Kazakhstan**

For information on Ethics in publishing and Ethical guidelines for journal publication see <http://www.elsevier.com/publishingethics> and <http://www.elsevier.com/journal-authors/ethics>.

Submission of an article to the National Academy of Sciences of the Republic of Kazakhstan implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see <http://www.elsevier.com/postingpolicy>), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The National Academy of Sciences of the Republic of Kazakhstan follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct ([http://publicationethics.org/files/u2/New\\_Code.pdf](http://publicationethics.org/files/u2/New_Code.pdf)). To verify originality, your article may be checked by the Cross Check originality detection service <http://www.elsevier.com/editors/plagdetect>.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the National Academy of Sciences of the Republic of Kazakhstan.

The Editorial Board of the National Academy of Sciences of the Republic of Kazakhstan will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайте:

[www:nauka-nanrk.kz](http://www.nauka-nanrk.kz)

ISSN 2518-1467 (Online), ISSN 1991-3494 (Print)

<http://www.bulletin-science.kz/index.php/en/>

Редакторы *М. С. Ахметова, Д. С. Аленов, А. Ахметова*  
Верстка на компьютере *А.М. Кульгинбаевой*

Подписано в печать 10.02.2021.  
Формат 60x881/8. Бумага офсетная. Печать – ризограф.  
20,17 п.л. Тираж 500. Заказ 1.