ISSN 2224-526X

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ
Қазақ ұлттық аграрлық университеті

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
Казахский национальный
аграрный университет

IZVESTIÂ

NATIONAL'NOJ AKADEMII NAUK
RESPUBLIKI KAZAHSTAN
Kazakh national
agrarian university

SERIÂ AGRARNYH NAUK

1 (49)

JANUARY – FEBRUARY 2019

PUBLISHED SINCE JANUARY 2011

PUBLISHED 6 TIMES A YEAR

ALMATY, NAS RK

Известия Национальной академии наук Республики Казахстан. Серия аграрных наук.
ISSN 2224-526X
Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы)
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№ 10895-Ж**, выданное 30.04.2010 г.

Периодичность 6 раз в год
Тираж: 300 экземпляров

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

Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of Agrarian Sciences.
ISSN 2224-526X
Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty)
The certificate of registration of a periodic printed publication in the Committee of Information and Archives of the Ministry of Culture and Information of the Republic of Kazakhstan N 10895-Ж, issued 30.04.2010

Periodicity: 6 times a year
Circulation: 300 copies

Editorial address: 28, Shevchenko str., of.219-220, Almaty, 050010, tel. 272-13-19, 272-13-18,
http://nauka-nanrk.kz / agricultural.kz

Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty

N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF AGRICULTURAL SCIENCES
ISSN 2224-526X
Volume 1, Number 49 (2019), 40 – 45 **https://doi.org/10.32014/2019. 2224-526X.5**

UDC 631.23.058

N. N. Khozhanov, Kh. I. Tursunbaev, M. K. Masatbayev, G. N. Khozhanova

Taraz State University named M. Kh. Dulati, Kazakhstan.
E-mail: khozhanov55@mail.ru; khambar2016@yandex.ru; masatbaev82@bk.ru; Khozhanova86@mail.ru

EVALUATION OF EMPIRICAL LINKS OF HUMUS FORMATION WITH ENERGY FACTORS IN THE ARID ZONE OF KAZAKHSTAN

Abstract. Performed analytical work to determine the relationship between natural performance and the level of humification of the soil (Mr) for the rational use of agronomic practices and predicting the biological yields of crops. The methods for calculating the humus uchityvaetsya natural resources reflect the influence of the climatic parameters for each region. Since there was a place of irrational use of bioenergy potential of the irrigated areas, the further formation and decomposition of the process of humus formation depends on the level of agricultural engineering and farming system.

In the plains, where the radiation index absolute terrain elevation (RL) of 0.3 the knife in order to maintain the process of humification at 1-2% or more must intensify the level of farming systems through the widespread introduction of phyto cultures.

Rational use and introduction of innovative technologies like drip irrigation, automation, water management creates favorable conditions for expanded reproduction of soil fertility and environmental improvement in irrigated agriculture.

Key words: gumuliauskiene, radiation index, fertility, harvest, technology, temperature and humidity, the elevation of the terrain.

Introduction. The European Union, together with Kazakhstan, is implementing a project ontransition to a green economy model. Based on this project, inthe address of the head of state to the people of the Republic of Kazakhstan from January 31.01.2017of the year "The third modernization of Kazakhstan: global competitiveness"noted that the agricultural sector should be a new driver of economy. This means about thenecessities to effectively useland for 5 years to increase the area of irrigated land by 40% and 11 to reach 2 million hectares with an increase in investment toagrarian research. While the implementation of prioritydirections by diversifying agricultural productionproducts in the agricultural sector allows increasing the level of processingproducts with the creation of an efficient system of storage, transportation andsales of goods, to ensure an increase in exports of food productsby 40% by 2021 [1]

The level of humus formation in natural conditions depends onagriculture from surface air temperature, temperature andsoil moisture, as well as from the evapotranspiration of the plant and evaporation withsoil surface that have a direct effecton crop productivity. This allows rational use of climatic data and zonal distribution of crops in order to obtain maximpossible biological yield of irrigated farming.

Analysis of years of marketing research has shown thatirrational use of energy resources led tostrengthening processes of anthropogenic desertification, which causesthe need to move to a new level of evaluation of the basic principles andfarming system methods.

Objects and methods. The practice of farming shows that the indicators of the ameliorative components mode are far from equivalent inzone of the same geographical area. The optimal combination of land in the structure of the natural-ecological complex is a difficult task and its solution should be based on a quantitative description of the interrelated natural, anthropogenic impacts and be optimized withtaking into account socio-economic and environmental indicators.

It is known that water and nutrients that determine the regulation of the main factors of plant life are in a state of uninterrupted circulation, and their direction is the same, but the speeds differ significantly. So, for example, ash and chemical elements are involved in both as biological and as man-made cycle, does the significant impact on the molecular processes occurring in the soil. Considering that soils are a complex mechanism, where microbiological processes play a significant role along with chemical reactions, agricultural production management should be aimed at regulating internal moisture circulation, balancing the accumulation and mineralization of organic matter and leading to an increase in fertility while satisfying the needs of plants in water and batteries [3].

The productivity of the agro-landscape, including the productivity of agricultural land and reclaimed land (Pegov, Khomyakov, 1981), is assessed as follows.

$$P = S * CL \text{ (for natural cenosis)} \quad \text{and} \quad P = S * ART * GGT$$

where P - potential productivity of vegetation biomass in given soil and climatic conditions. t / ha of air-dry matter; S - index of the soil; CL - climate favorable factor; ART - indicator of compliance with the climatic conditions of this culture; GGT - coefficient depending on the culture of production.

With increasing production potential, it is very important to know the dynamics of accumulation or drawdown of humus reserves in the soil. The change in humus reserves can be approximately described by a differential equation (Golovanov A.I, 2008).

$$dG / dt = A- BG. \text{ t / (ha * year)},$$

$$G = A / B + (G_0 - A / B) \exp (-B * t),$$

where G_0 is the current reserves of humus, t / ha; A - formation of new humus due to humification of plant residues (G_{plant}) or organic fertilizers (G_{org}), including siderite, as well as loss of humus at descending moisture currents (G_{physis}), t / ha; B - coefficient taking into account the loss of humus, year $^{-1}$; t - time, year.

The formation of new humus is estimated by dependency:

$$A = G_{plant} + G_{org} + G_{phys}$$

To calculate the amount of humus in the humification of organic residues, you can use the formula (Vasilyeva, 1984):

$$G = P * K_r * K_h ,$$

where P is the yield of agricultural crops, t / ha; K * is the root yield ratio (dry matter); K_h - coefficient humification dry matter. The values of the coefficients K_r, and $K_h$are listed in table 1.

Table 1 – The value of the coefficients K_r and K_h (Vasiliev, 1988)

Culture	Organic matter yield of root residues (dry matter) (K_r.)	Coefficient of humification of dry matter (K_h)
1-year perennial grasses for hay	0.6	0.2
1-year perennial grasses for hay	0.15	0.2
Perennial grasses 2 and 3 years for hay	1.2	0.2
Perennial grasses 2 and 3 years for green fodder	0.3	0.2
Hay annual herbs	0.4	0.2
Annual herbs for green food	0.4	0.2
Cereals and legumes	0.8	0.2
Potatoes (roots)	0.1	0.1
Corn for silage	0.07	0.2

Estimation of the amount of humus coming in the composition of organic fertilizers is carried out using an iso-humus coefficient determining the amount of stable humus formed from 1 kg (in terms of dry matter) of organic matter introduced into the soil or organic fertilizer (Loze, Mathieu, 1998):

$$G_{org} = K_i ,$$

where K_i is the isohumus coefficient; D - dose of organic fertilizer, t / ha of dry matter.

From the analysis of these materials, it becomes clear that under the influence of vegetation, the number and composition of microorganisms, and consequently, the intensity of the processes in which they participate, change. Such changes, the result of the interaction of plants and microorganisms, determine the degree of development and nutrition of crops. In this regard, we believe that there is a need to study the microflora of the rhizosphere in order to develop techniques that favorably affect its development and composition, improve the nourishment of oasthenia and obtain high yields, taking into account the energy resources of a particular area.

Based on many years of field research for the period 1984–2016 in the region of the southern Aral Sea region, N. Khozhanov identified the structure of the formation of the natural environment, the level of soil humus formation (Mp), which shows that the maximum number of factors affecting the soil-forming process, focused on the level of the landscape provinces and geographical areas, is described by the following expression:

$$M_p = (0.42\ R_h\ ,, + 0.15\beta + 0.09S_n + 0.09T_b + 0.08W_B + 0.04V_B + 0.040_C + 0.03\ M_{org} + 0.03_h) * 0.1\mu;$$

where R_h " is the radiation balance taking into account terrain marks, β is the proportion of groundwater salinity, S_n is the indicator of soil salinity, T_b is the air temperature, W_b is the air humidity, V_w, is wind speed, O_c is the amount of precipitation, M_i is the fraction of salinity of irrigation water , h_h - level of ground waters, μ - coefficient taking into account the use of agricultural methods and farming system [6, 7, 11].

In the process of humus formation, solar radiation (R), latitude ($_\varphi$) and altitude (H), as well as air temperature inperiod above 10 ° C [2, 3].

Empirical relationship of the radiation balance (R) with the sum of temperatures (t) above 10 °C:

- for areas of excessive moisture (V.S. Mezentsev et al., 1969) gives in the following formula:

$$R = 0.01042\ et > 10C + 8.52;$$

- for the Urals (G.V. Belenenko, 1969):

$$R = 0.011\ et > 10eC + 7.0;$$

- for Belarus (M.G.Golchenko, 1971):

$$R = 0.0093\ et > 10\ ^\circ C + 10.80;$$

- for the arid zone of Russia and Central Asia (Yu.N.Nikolsky, V.V. Shabanov, 1986):

$$R = 13.39 + 0.0079\ et > 10eC;$$

- for the south-east of Western Siberia (V.V. Doroschenko, 1971):

$$R- 2.25\ (6t / 1000)\ 2 + 0.60\ (et / 1000) + 20.4;$$

Semi-empirical links of the radiation balance (R) with latitude (<p) and terrain height (H):

- for SIG station (B.M.Bratchenko, 1967):

$$R = 88.3 - 1.06\ f - 0.0324H^{0,8} + 0.15\boldsymbol{\alpha} ,$$

where **α** is the duration of sunshine in May-August as a percentage of the possible.

Results and discussions. For the natural system of Kazakhstan, the indicators of radiation balance (R), depending on the absolute height of the terrain (H), have not been previously considered. Therefore, we tried to identify this gap of science and clarify the actual energy indicators, taking into account the geography of the area:

- for the Southern region of Kazakhstan

$$R = \frac{LOc(1000-H}{250}$$

In our proposed equations will represent the actual geographical state of a particular region. It clearly expressed indices of latent heat of vaporization (L), height of the terrain (N) and amount of precipitation (Oc), which reliably reflects the actual values of the radiation balance (R) [4, 5, 12-14].

The study of the heat balance of the irrigated zone allowed us to establish a link between the radiation balance (R) and evaporation (E_0), which is correlated by the dependence:

$$R = (E_o + 800) / 10;$$

- for the middle and lower reaches of the Amudarya and Syrdarya rivers, the correlation between the relative air humidity (WB) and evaporation is described by the equation:

$$E_o = 1000\sqrt{\frac{L}{Wb}}$$

Thus, based on the data of the radiation balance, it became necessary to further improve the methodology for regulating soil-meliorative criteria based on the energy resources of a specific area. The ratio of the radiation balance to the absolute height of the terrain in the arid zone of Central Asia and Kazakhstan is about 0.61-28.96 and can be expressed in the form:

$$\mathbf{R_H = R/H}$$

and describe as an indicator of the radiation index per unit of absolute height of the maximum, From here it can be seen that with the same soil-climatic zone, the indicators (R_H) are not the same. This gives grounds to believe that the agrotechnical and ameliorative measures used in the long-term section, aimed at obtaining large crop yields of agricultural crops, have not fully justified themselves. Since there was a place of irrational use of bioenergy potential, which determined insolvency and difference in terms of the indicator (R_H) [6-11].

- for the mountainous zone $2.0 < R_H < 28.96$;
- for the foothill zone, the indicators range from $0.3 < R_H < 2.0$;
- for the flat zone of Kazakhstan - $0 < R_H < 0.3$,

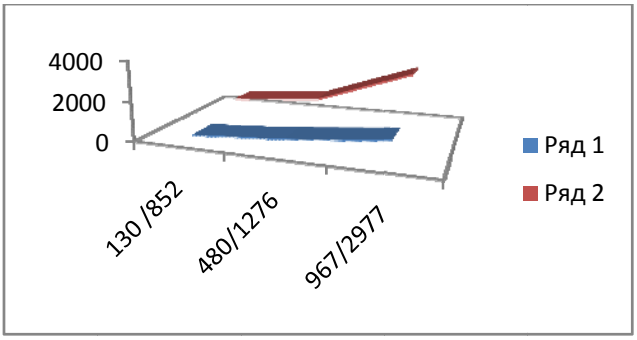
Along with this, the radiation index of the absolute height of the terrain (R_n) with evaporation is correlated by the dependence:

$$R = (E_o + 800) / 10H.$$

From the above it follows that in the formation of humus formation in the arid zone with a range of changes in natural climaticresources within:

R_H - 0.1-28.8 kcal / cm^2; β - 1.0-5.0%;
S_n - 0.01-0.1%; T_w. - 20-26 °C;
W_d - 30–60%; V_w. - 2-6 m/s;
O_c - 100-300 mm; M_{org} - 0.5-2.0 g/l; h - 1-5 m.

On the basis of the calculated climatic data, it follows that at minimum values the soil humus formation level is M_p 0.852%, and at maximum values it corresponds to 2.977%. The soil humus formation level changes depending on the absolute terrain presented in graph.



Soil humus formation in the arid zone

Thus, over the course of many years in the development of the programmed cultivation of crops on the basis of predictive calculations using empirical formulas, scientists and experts distorted the calculated data to predict the food program, which ultimately affected the gross yield and sustainability of the agricultural sector.

Table 2 – Calculation of the utilization rate of plant bioenergy resources

#	Meteo stations	Calculated bioenergy coefficient	Biological crop of corn for silage, t / ha		Opportunities for biological damage, share
			when R on tv	with calculated R	
1	Suzak	0.061	63.2	104.4	1.65
2	Turkestan	0.090	69.1	155.1	2.24
3	Tulkubas	0.096	63.8	164.5	2.57
4	Arys	0.091	69.9	172.2	2.35
5	Shymkent	0.127	65.9	217.5	3.5
6	Shardara	0.095	69.7	162.6	2.24

Since there was a place of irrational use of bioenergy potential of the irrigated areas, the further formation and decomposition of the process of humus formation depends on the level of agricultural engineering and farming system.

Conclusion.

1. Implementation of the analytical work allows to determine the relationship between natural indicators and the level of soil humus formation (M_p) for the rational use of agricultural practices and prediction of biological yields of agricultural crops.

2. The proposed methods for calculating humus formation take into account the natural natural resources reflecting the influence of klimit parameters for each region.

3. Studies have established that in the limits of the arid zone of Central Asia and Kazakhstan, in particular in the areas of the Southern Aral Sea region, natural-climatic indicators provide an annual and natural/conditions to create from 0.852 to 2.977% of humus

4. In the plain zone, where the radiation index of the absolute height of the terrain (R_H) is 0.3 in order to maintain the process of humus formation at the level of 1-2% and more, it is necessary to intensify the level of agricultural budgets through the widespread introduction of phytomelioretive crops.

5. Rational use and introduction of innovative technology, such as drip irrigation, water use automation, creates favorable conditions for the expanded reproduction of soil fertility and ecological improvement of irrigated agriculture.

Н. Н. Хожанов, Х. И. Турсунбаев, М. Қ. Масатбаев, Г. Н. Хожанова

М. Х. Дулати атындағы Тараз мемлекеттік университеті, Қазақстан

ҚАЗАҚСТАННЫҢ АРИДТІ АЙМАҒЫНДА ҚАРАШІРІК ПАЙДА БОЛУЫНДА ЭНЕРГЕТИКАЛЫҚ ФАКТОРЛАРДЫҢ ЭМПИРИКАЛЫҚ БАЙЛАНЫСТАРЫН БАҒАЛАУ

Аннотация. Агрономиялық әдістерді тиімді пайдалану және ауыл шаруашылығы дақылдарының биологиялық өнімдерін болжау үшін топырақтың гумификациясының табиғи көрсеткіштері мен оның гумификация (МР) деңгейі арасындағы өзара байланысты анықтау бойынша аналитикалық жұмыс орындалды.

Гумусты есептеу әдістері табиғи ресурстарды есепке алу әрбір өңір үшін климаттық параметрлердің әсерін көрсетеді. Суармалы алқаптардың биоэнергетикалық әлеуетін тиімсіз пайдалану орын алғандықтан, гумус түзу процесінің одан әрі қалыптасуы мен ыдырауы агротехника мен егіншілік жүйесінің деңгейіне байланысты болады. Жердің абсолюттік рельефінің радиациялық индексі (RL) жазықтарда 0,3-ке тең, Қарашірік пайда болу процессін 1-2% және одан да жоғары деңгейде қолдану үшін фитомелиоративтік дақылдарды кеңінен енгізу есебінен егіншілік жүйелерінің деңгейін қарқындату қажет. Тамшылатып суарудың, автоматтандырудың, су ресурстарын басқарудың инновациялық технологияларын ұтымды пайдалану және енгізу топырақтың құнарлылығын кеңейтіп толықтыру және суармалы егіншіліктегі экологиялық жағдайды жақсарту үшін қолайлы тәсіл жасайды.

Түйін сөздер: қарашірік, радиация көрсеткіші, құнарлылық, егін, технология, ауа температурасы мен ылғалдылығы, жер бедері.

Н. Н. Хожанов, Х. И. Турсунбаев, М. К. Масатбаев, Г. Н. Хожанова

Таразский государственный университет им. М. Х. Дулати, Казахстан

ОЦЕНКА ЭМПИРИЧЕСКИХ СВЯЗЕЙ ГУМУСООБРАЗОВАНИЯ С ЭНЕРГЕТИЧЕСКИМИ ФАКТОРАМИ В АРИДНОЙ ЗОНЕ КАЗАХСТАНА

Аннотация. Выполнена аналитическая работа по определению взаимосвязи между естественными показателями гумификации почвы и уровнем ее гумификации (МР) для рационального использования агрономических методов и прогнозирования биологических урожаев сельскохозяйственных культур. Методы расчета гумуса учитывается природных ресурсов отражают влияние климатических параметров для каждого региона. Поскольку имело место нерациональное использование биоэнергетического потенциала орошаемых площадей, дальнейшее формирование и разложение процесса гумусообразования зависит от уровня агротехники и системы земледелия. На равнинах, где радиационный индекс абсолютного рельефа местности (RL) равен 0,3, для поддержания процесса гумификации на уровне 1-2% и более необходимо интенсифицировать уровень систем земледелия за счет широкого внедрения фитомелиоративных культур. Рациональное использование и внедрение инновационных технологий капельного орошения, автоматизации, управления водными ресурсами создает благоприятные условия для расширенного воспроизводства плодородия почв и улучшения экологической обстановки в орошаемом земледелии.

Ключевые слова: гумификация, показатель радиации, плодородия, урожая, технологии, температура и влажность воздуха, рельеф местности.

Information about authors:

Khozhanov N.N., Ph.D., Professor, Associate Professor, Taraz State University named M. Kh. Dulati, Kazakhstan; khozhanov55@mail.ru; https://orcid.org/0000-0003-0671-8307

Tursunbaev Kh.I., Senior Lecturer, Taraz State University named M. Kh. Dulati, Kazakhstan; khambar2016@yandex.ru

Masatbayev M.K., doctoral student, Taraz State University named M. Kh. Dulati, Kazakhstan; masatbaev82@bk.ru; https://orcid.org/0000-0002-8171-9716

Khozhanova G.N., student, Taraz State University named M. Kh. Dulati, Kazakhstan; Khozhanova86@mail.ru; https://orcid.org/0000-0002-6752-1607

REFERENCES

[1] Mustafasv J.S., Ryabiev A.D., Adilbltagi G.A. Metmmgh imcm basis for assessing the sustainability and stability of landscapes. Taraz, 2007. 218 p.

[2] Prigogine I., Kondetudi D. Modern thermodynamics of thermal converters up to disputed structures / Per. from English. M.: World, 2009. 461 p.

[3] Kireycheva L.B. Methodology of management of land-reclamation regimes of agricultural lands during hydro-reclamation // Materials of the international NPK (Kostyakovskie reading). M., 2013. P. 14-22.

[4] Nikolsky Yu.N., Shabanov V.V. Calculation of the design yield depending on the water regime of reclaimed land // Hydrotechnics and Land Reclamation. 1986. N 9. P. 52-56.

[5] Seytkaziev A.S., Zhaparova S.B., Khozhanov N.N., Seitkazieva K.A. Ecological assessment of the process in pollution of agricultural landscapes and methods for improving saline lands. Kokshetau, 2016. 278 p.

[6] Tursunbaev Kh.I., Seitkaziyev A.S., Khozhanov N.N. et al. Development of intensive technology for the cultivation of weakly growing fruit trees in the gray soils of the Zhambyl region // Publishing house "Problems of Science" Journal of Science and Education. March 2017. N 3(27).

[7] Khozhanov N.N., Seitkaziev A.S., Tursunbaev Kh.I. et al. Energy of intensive farming system // Publishing house "Problems of Science" Journal of Science and Education. December 2017. N 12(36).

[8] Khozhanov N.N., Musabekov K.K. et al. Integrated Land Reclamation – The Basis of a Green Economy in Agriculture // XXXIV International University of Chicago. May 25, 2017.

[9] Khozhanov N.N., Masatbaev M.K., Abdeshev K.B., Elyubayev S.Z., Tursunbaev Kh.I. Energy Concept for the Development of the Agriculture System // News of Gorsky State Agrarian University. 2018. N 55 (Part 1). P. 20-26.

[10] Seitkaziev A.S., Khozhanov N.N., Maimakova A.K., Seitkazieva K.A.
Environmental assessment of the studies area by salinity level // Research, results. 2018. N 1(77). P. 254-260. ISBN 2304-334-02.

[11] Nasiev B.N., Zhanatalapov N. Zh., Bekkaliyev A.K., Makanova G.N. Indicators of soil degradation in the lands of the estuary irrigation of the ZPO semi-desert zone // News NAS RK. Series of Agrarian Sciences. 2012. N 6. https://doi.org/10.32014/2018.2224-526X. ISSN 1991-3494 2224-526X.

[12] Mustafaev Z.S., Kazykeeva A.T., Kireicheva L.V., Umirzakov S.I., Zhusupova L.K. Identification of environmentally safe technology for the development of saline lands in the production conditions of the Kyzylorda region // News NAS RK. Series of Agrarian Sciences. 2018. N 6. https://doi.org/10.32014/2018.2224-526X. ISSN 1991-3494 2224-526X.

[13] Mustafaev Z.S., Kozykeeva A.T., Tursynbaev N.Kh. Substantiation of the ecological services of the catchment area of the transboundary Talas river based on the assessment of the bioclimatic potential of the landscape systems // News NAS RK. Series of Agrarian Sciences. 2017. N 4. https://doi.org/10.32014/2018.2224-526X. ISSN 1991-3494 2224-526X.

[14] Rau A.G., Olzhabaeva A.O. Increasing the natural resource potential of degraded lands in rice irrigation systems of the Kyzylorda array of irrigation // News NAS RK. Agrarian Sciences Series. 2016. N3. https://doi.org/10.32014/2018.2224-526X. ISSN 1991-3494 2224-526X.

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). 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://agricultural.kz/index.php/en/

Редактор *М. С. Ахметова, Т. М. Апендиев, Д. С. Аленов*
Верстка на компьютере *Д. Н. Калкабековой*

Подписано в печать 13.02.2019.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
4,7 п.л. Тираж 300. Заказ 1.