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THE RATIONAL LAND USE OF AGRICULTURAL PURPOSE IN THE LAND LAW OF THE REPUBLIC OF KAZAKHSTAN

Abstract. A necessary condition for the rational use of land is to increase the efficiency of their use in agricultural production. One of the methods of identifying inefficient land use is inventory. The purpose and objectives of the inventory of land plots are to increase the efficiency of land use, identify unused, inefficiently used land plots that are not intended for their intended purpose, their registration and determination of the quality status.

Keywords: Land resources, rational, full, efficient land use, land degradation, soil fertility, land protection, natural environment, agricultural land, crop yield, crop rotation.

Introduction. The rational use of agricultural land is an ensuring the owners of land plots and land users in the process of agricultural production and effective use of land resources, including the prevention of a significant reduction in soil fertility and land reclamation condition, the optimal use of land in order to obtain the necessary productivity indicators.

The rational use of agricultural land includes:

- maintenance and improvement of land fertility (a certain level of total humus, easily hydrolyzed nitrogen, mobile phosphorus and exchangeable potassium in the arable layer);
- maintaining and increasing a certain level of yields of the main agricultural crops;
- compliance with crop rotations;
- preservation and improvement of fertility and ameliorative state of the soil;
- prevention of disposal of agricultural land from economic circulation, prevention of land overgrowing by weeds, trees and shrubs, as well as littering with household and industrial waste;
- revention of the burning of crop residues and by-products of agricultural crops on cultivated agricultural land.

To determine the rational use of agricultural land from agricultural producers, you must have the following documents:

1. statistical data on the statistical form of the nationwide statistical observation "Report on the results of sowing for the harvest" index 4-ag, annual periodicity, statistical form of the national statistical observation "On harvesting agricultural crops" index 29-ag, annual periodicity (in land use for crop production), approved by order of the Chairman of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan from December 4, 2014 No. 67, (registered in the Register of State registration of regulatory legal acts No. 10134);
2. crop rotation plan according to the form, according to Table 1 (in using land for crop production);
3. projects of internal land managemen;
4. passports of agricultural land plots.

Rational land use for agricultural purposes. When growing crops, agricultural commodity producers observe crop rotations in accordance with the crop rotation plan which is approved on the basis of recommendations of scientific organizations published for general use.

The crop rotation plan is approved by the agricultural commodity producer for a period corresponding to the full turnover of agricultural crops, depending on the selected rotation system of the crops grown. One copy of the approved crop rotation plan is sent to the local executive body at the location of the land plot.

No significant decrease in soil fertility is allowed for the following indicators:

- a decrease in the arable horizon (0-20 centimeters) of the total humus content by more than five percent, the weighted average content of easily hydrolyzed nitrogen, mobile phosphorus and exchangeable potassium by more than twenty percent;
- land areas increasing with a very low and low indicators of the supply of humus and nutrients by more than ten percent;
- pollution of agricultural land with pesticides and mineral fertilizers above the maximum permissible concentrations;
- reduction due to erosion of the capacity of the upper humus horizon by more than 5 centimeters;
- increasing in the soil layer to 30 centimeters of the amount of toxic salts:
- chloride more than 0.4 percent;
- sulphate more than 0.8 percent;
- an increase in alkalinity in the soil by more than 5 percent;
- withdrawal of a land plot from agricultural use due to overgrowing by weeds (with the number of weeds, above the permissible economic threshold) or quarantine vegetation.

Information on fertility and ameliorative condition of agricultural land is reflected in the passport of the agricultural land, the form of which is approved in accordance with subparagraph 7) of paragraph 1 of article 14 of the Land Code of the Republic of Kazakhstan.

Agricultural producers maintain crop yields at the average level in the corresponding region of the region, but not less than eighty-five percent of the average area indicator.

The order of ensuring rational use of agricultural land.

Agricultural land fertility monitoring and the compliance of agricultural producers with the requirements are monitored by the agrochemical service and the State Corporation “Government for Citizens” based on the data obtained from soil, agrochemical and phytosanitary surveys of agricultural lands and land monitoring.

In order to ensure the rational use of land, the local executive body of the region, the city of republican significance, the capital, districts, cities of regional significance informs the agrochemical service about the newly granted agricultural land plots within a month after issuing title documents.

The agrochemical service conducts an agrochemical examination of the soil during the first calendar year after the production of title documents by the agricultural commodity producer.

The indicators of the total humus content in the arable horizon, the weighted average content of hydrolysable nitrogen, mobile phosphorus and exchangeable potassium are determined by the results of an agrochemical soil survey conducted cyclically once every seven years - on irrigation, and compared to indicators , fixed primary (base) round and subsequent rounds of agrochemical survey.

1. Agricultural land for crop production is a comparison of data on agricultural yields.
2. The concept of land Fund of Kazakhstan
3. Rules of rational use of land of agricultural purpose
4. The order of ensuring rational use of agricultural land
5. The concept of a passport for agricultural land
6. Passport content
7. Preparation of a passport for agricultural land - preparatory work, filling in a passport, approval
8. Report on the implementation of the preparatory work of the passport in the regions of the Republic of Kazakhstan.

The average yield is calculated in the context of crops, as well as in the context of irrigated and non-irrigated agricultural land.

Obtaining by an agricultural commodity producer a level of crop yield of less than eighty-five percent of the average regional indicator for the relevant crop for three consecutive years is an irrational use of agricultural land [1].

Table 1 – Crop rotation plan of the crops obtained by agricultural producers, with indicators of the average yield for the respective crops

Cadastral number of the land plot on which the corresponding field (land) is located	Field number in accordance with the land use plan and/or passport of the land plot, its area, hectare (ha)	Predecessors (cultures) before the year of drawing up the plan of crop rotation			Placement of crops in the planning period		
		20 _ year	20 _ year	20 _ year	20 _ year	20 _ year	20 _ year
	1 _____ ha						
	2 _____ ha						
	3 _____ ha						
	4 _____ ha						
	5 _____ ha						
	6 _____ ha						
	7 _____ ha						

The passport form of the agricultural land is approved by the Order of the Acting Of the Minister of National Economy of the Republic of Kazakhstan dated April 17, 2015 No. 344.

The passport of the agricultural land includes the following items:

1. General information. Explication of land. External land users (owners) within the boundaries of the land plot. Land plan (with contours of land)

2. The quality of the land. The distribution of agricultural land on soils. Humus content of arable land (in a layer of 0-20, 0-50 centimeters).Reclamation of arable land. The alkalinity of the soil in the horizon B1,%. Changes in the thickness of the upper humus A + B1 horizon as a result of erosion of arable land. The content of the sum of toxic salts in irrigated arable land (in a layer of 0-30 centimeters).

3. Cultural and technical condition of forage lands. Soil map. Legend to the soil map. Geobotanical map. Legend to a geobotanical map: Cadastral evaluation of land. The score of bonitet. Cadastral (evaluated) value of the land.

In the article 97 of the Land Code of the Republic of Kazakhstan (amended and supplemented as in June 29, 2017) it is clearly stated the importance of a passport for agricultural land “For the purpose of state control over the quality of agricultural land transferred to land use and property to citizens and legal entities, a passport of agricultural land plots is compiled on the basis of data from soil, soil-reclamation, geobotanical surveys and grading materials due to budgetary funds.

The passport form for agricultural land plots is approved by the central authorized body.

The organization of work on drawing up a land passport and its issuance is carried out by authorized bodies of regions, cities of republican significance, the capital, districts, cities of oblast significance at the location of the land plot. ”

And the 153 article of the Code is written on the maintenance of the land

“The maintenance of the state land cadastre and the activities technologically related to its maintenance of the manufacture of passports of land plots.

The activities related to maintaining the state land cadastre include:

- the establishment of the borders of administrative-territorial units, specially protected natural territories, lands of the state forest and water funds;

- drawing up projects for the education and streamlining of land use, projects for the reclamation of disturbed land, the establishment of the boundaries of land on the ground;

- development of on-farm land management projects for land plots owned by the state and provided for use of land for agricultural production;

- conducting land inventory".

The financing of certification of land plots is specified in Article 163 of the Land Code of the Republic of Kazakhstan “Land management carried out when establishing the boundaries of regions, capital and cities of republican significance, maintaining a land cadastre and monitoring land, drawing up

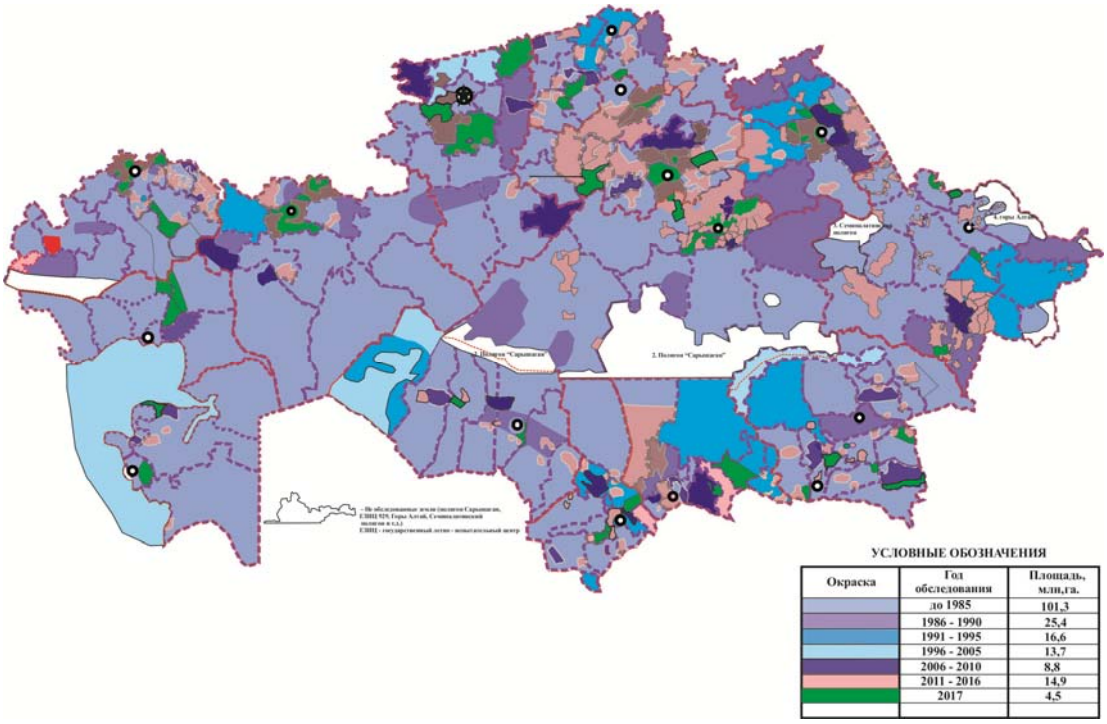
passports for agricultural land plots and other works carried out by decision of the Government of the Republic of Kazakhstan are carried out at the expense of budget funds" [2].

In the reporting year, in accordance with the budget subprogramme 100 "Formation of State Land Cadastre Information" of the budget program 259 "Increasing the availability of information on land resources", a soil survey of agricultural land was conducted on an area of 4,500.0 thousand hectares and updating soil materials for certification purposes agricultural land on an area of 650.0 thousand hectares. The state order for soil surveys has been completed.

The volumes of soil surveys for the state order in 2017 by regions are shown in the table 2.

Table 2 – Completion of volumes of soil surveys by regions in 2017, thousand hectares

Name of areas	Volume, total	Including	
		soil survey of agricultural land	updating soil materials for land certification
Akmola	739,5	639,5	100,0
Aktobe	279,0	259,0	20,0
Almaty	661,0	576,0	85,0
Atyrau	200,0	200,0	–
East-Kazakhstan	394,3	334,3	60,0
Dzambyl	322,0	242,0	80,0
West-Kazakhstan	351,1	326,1	25,0
Karagandy	307,2	277,2	30,0
Kyzylorda	195,0	165,0	30,0
Kostanai	445,1	385,1	60,0
Mangistau	231,1	231,1	–
Pavlodar	295,0	245,0	50,0
North-Kazakhstan	409,7	374,7	35,0
South-Kazakhstan	320,0	245,0	75,0
Almaty	–	–	–
Astana	–	–	–
Total	**5150,0**	**4500,0**	**650,0**



Cartogram of the availability of soil survey materials

In the reporting year, the largest areas of the new soil survey of agricultural land were performed in Akmola oblast - 639.5 thousand hectares, Almaty oblast - 576.0 thousand hectares and Kostanay - 385.1 thousand hectares, in the agricultural areas - in Akmola (100.0 thousand hectares), Almaty (85.0 thousand hectares), Zhambyl (80.0 thousand hectares), South Kazakhstan (75.00 thousand hectares) oblasts.

Conclusions. The problems of watering vast pasture areas are also closely related to issues such as water mechanization, the establishment of operational services, the protection of structures from seasonal and permafrost and the economic efficiency of these measures.

The vast majority of mine wells in the steppe and desert areas have a small flow rate, so they are operated in a periodic mode. This implies the relevance of the study of the mode of operation of mine wells in conditions of periodic water withdrawal on pastures for watering animals.

Method. The indicators of the total humus content in the arable horizon, the weighted average content of hydrolysable nitrogen, mobile phosphorus and exchangeable potassium are determined based on the results of an agrochemical soil survey conducted cyclically once every seven years on raincoat and once every five years on irrigation, and compared with the indicators recorded by the primary (base) round and subsequent rounds of the agrochemical survey of the Republic of Kazakhstan

Research results and discussion. A soil survey in the republic is carried out mainly on intensively used agricultural lands and in areas where there are no benign materials. The main scale of the survey in the irrigated area is 1:10 000, the rest of the territory is 1:25 000.

Since 2003, a new soil survey was conducted on an area of 32.3 million hectares, which is 17.4% of benign materials from the entire survey area, and from the area of all agricultural land is 14.6%. The existing rates of soil surveys do not allow providing even arable land with new survey materials in the required amounts. As a result, the deadlines for updating soil surveys are violated [3].

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РАЦИОНАЛЬНОЕ ИСПОЛЬЗОВАНИЕ ЗЕМЕЛЬ СЕЛЬСКОХОЗЯЙСТВЕННОГО НАЗНАЧЕНИЯ В ЗЕМЕЛЬНОМ ЗАКОНОДАТЕЛЬСТВЕ РЕСПУБЛИКИ КАЗАХСТАН

Аннотация. Необходимым условием рационального использования земель является повышение эффективности их использования в сельскохозяйственном производстве. Одним из методов выявления неэффективного использования земель является инвентаризация. Целью и задачами инвентаризации земельных участков являются повышение эффективности использования земельных ресурсов, выявление неиспользуемых, нерационально используемых, не по целевому назначению земельных участков, их учет и определение качественного состояния.

Ключевые слова: земельные ресурсы, рациональное, эффективное использование земли, деградация земель, плодородие почв, охрана земель, природная среда, земли сельскохозяйственного назначения, урожайность сельскохозяйственных культур, севообороты.

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ҚАЗАҚСТАН РЕСПУБЛИКАСЫНЫҢ ЖЕР ЗАҢНАМАСЫНДА АУЫЛШАРУАШЫЛЫҒЫ ЖЕРЛЕРІНІҢ ҰТЫМДЫ ПАЙДАЛАНЫЛУЫ

Аннотация. Ауыл шаруашылығы өндірісінде жерді пайдалану тиімділігін арттыру әдістерінің қажетті шарты болып жерді ұтымды пайдалану табылады. Жерді тиімсіз пайдалану мақсаты мен міндеттері оларды түгендеу болып табылады. Жер телімдерін түгендеу пайдалану тиімділігін арттырады, жер ресурстарын, анықтау пайдаланылмайтын, тиімсіз пайдаланылатын, нысаналы мақсаты бойынша пайдаланылмаған жер учаскелерін, оларды есепке алу және сапалық жай-күйін анықтауға атсалысады.

Түйін сөздер: Жер ресурстары, тиімді, толық, жерді тиімді пайдалану, жердің тозуы, топырақтың құнарлылығы, жерді қорғау, табиғи орта, ауыл шаруашылығы мақсатындағы жерлер, ауыл шаруашылығы дақылдарының өнімділігі, ауыспалы егістер.

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STUDYING THE ANTAGONISTIC PROPERTIES OF LACTOBACTERIN-TK^2 PROBIOTICS ON PATHOGENIC STRAINS CAUSING GASTROINTESTINAL PATHOLOGY IN CALVES AND LAMPS

Abstract. This article contains the researchesof antagonistic activity of pathogenic bacteria causing a gastro-intestinal disorder in calves and lambs in their first days of life. The antagonistic activity on the pathogenic intestinal microflora has been studied *in vitro*.

Key words: *Escherichia Coli, Salmonella AbortusOvis, Proteus Vulgaris,* Lactobacterin-TK^2, calves and lambs, gastrointestinal pathology, research.

Introduction. Recently, among infectious diseases of calves and lambs, gastrointestinal diseases of bacterial etiology occupy a special place.

Pathogenic strains of Escherichia, Salmonella and Proteus, which cause gastrointestinal disorder in calves and lambs in their first days of life, play a leading role in the nosological profile of these diseases [1].

Pathogenic strains of *Escherichia Coli, Salmonella AbortusOvis* and *Proteus Vulgaris* belong to Enterobacteriaceaefamily and, by morphology, are small gram-negative straight rods [2].

According to the official definition, escherichiosis or colibacteriosisin animals is an acutely occurring zoonotic disease, which usually infests young animals, and characterized by diarrhea, septicemia, toxemia and enteritis, general dehydration of the body, disorders of the central nervous system, symptoms of gradually increasing depression and weakness.

Escherichia are permanent inhabitants of the intestines of warm-blooded animals, generally, they live in the lower parts of the gastrointestinal tract. Some of them can cause lesions of the gastrointestinal tract that was experimentally proven by G. N. Gabrichevsky in 1894 and confirmed clinically by A. Adam. Calves and lambs become ill with escherichiosismainly in the first 2-7 days of life, but also the disease often affects one- and two-month-old calves and lambs [3]. The incidence of disease can reach up to 90%, and the mortality rate is about 30-50%. The incubation period of the disease lasts from several hours to 1-2 days. Escherichiosisin calves and lambs can occur in the septic, enteritic and enterotoxemic forms [4].

A characteristic symptom of the disease is the feces color, which in most cases has a white, yellowish or bright yellowish color with a greenish tinge and a sour odor. In calves and lambs affected by escherichiosis, subfebrile temperature reaches 40-40.5°C, the rapid toxicosis development is manifested by the rejection of colostrum, lethargy and lying long. [5]

Salmonellosis is an infectious disease in young farm animals, which is characterized, when in acute form, by fever, septicemia and diarrhea, and when in chronic form – by pneumonia.

The sources of pathogen of this infection are sick and ill animals. Adult animals can be salmonella carriers, releasing the pathogen with milk and feces, abortus fetus, amniotic fluid, and outflows from the birth canal. Sick young animals produce a pathogen with feces, urine, nasal effusion, saliva [6].

In case of delayed medicated treatment, the condition of sick animals worsens by the end of the first or second day of disease and is characterized by a complete lack of appetite and sucking reflex, adynamia, anuria, a decrease in body temperature to 36-37.7°C, cyanosis and dry mucous membranes, deep drooping of the eyeballs, involuntary outflow of watery feces from the anus. Calves and lambs predominantly die from dehydration.

Proteas are one of the most well-known genera of the Enterobacteriaceae family.

All types of proteas belong to the group of conditionally pathogenic microorganisms, which exhibit a negative effect on the body while reducing antimicrobial protection. For the development of infection, the virulent properties of bacteria are important. The most important pathogenic factors of the proteas are: fimbriae, bacterial proteas and urease, hemolysins, hemagglutinins, and the ability to "swarm".

Dysbiotic disorders of the gastrointestinal tract can cause acute intestinal diseases in newborn calves and lambs due to the prevalence of enterobacteria over the symbiotic flora, that is a feature in the development of intestinal microbiocenosisin calves and lambs in the first 7 days of life [7].

Enteropathogenic bacteria are able to show resistance to certain types of antibiotics. Recently, one of the important advances in the field of medicine is the establishment of the fact that the microflora inhabiting the organism of animals is not beneficial only, but necessary for its vital activity as well. It is known that the most numerous and complex in terms of its composition is the bacteria population in the intestine, especially in its lower parts [8].

Therefore, the search for effective forms of prophylaxis, using the beneficial microflora, which are able to stop the spread and development of dysbiotic conditions of the gastrointestinal tract of calves and lambs in time, is a hot topic.

Relevance of research. In our country, gastrointestinal diseases of bacterial etiology in calves and lambs remain relevant and continue to cause significant economic damage, since without introducing new means of prevention and therapy of these diseases it will be impossible to obtain high-quality animal products [2].

These pathologies also affect the normal gastrointestinal microflora of the animal organism. A number of scientists believe that one of the stimulating factors for occurrence of gastrointestinal pathologies contributes to the disorders in the gastrointestinal microbiocenosis. These disorders causing this series of disorders are united by a common name - dysbacteriosis [9].

A number of authors believe that the cause of dysbacteriosis is the excessive use of drugs, in particular antibiotics and other antimicrobial drugs. Their accumulation in the body, especially in young animals, leads to a weakening of natural resistance and, as a rule, leads to the formation of infectious processes [1, 3, 9, 10].

It is well known that probiotics are one of the most promising agents for treatment and prevention of dysbiotic conditions. Probiotic drugs or food products contain live microorganisms, most often lactobacteria (lactobacilli, bifidobacteria, enterococci). World experience shows that in the prevention and treatment of gastrointestinal diseases in young animals, replacement therapy is important, which is aimed at restoring the intestinal biocenosis through the regular introduction of live bacteria, representatives of the normal intestinal microflora. The drugs they contain are known as probiotics. Probiotics are used to stimulate the immunity, prevent and treat mixed gastrointestinal infections, digestive disorders resulting from a sudden change in the diet composition, disturbed feeding regimes, technological stress, etc. [1, 11].

Currently, many farms successfully practice of calf growing [12].The advantage of probiotic agents containing lactobacilli is that they are harmless to the organism and there is no addiction to them during prolonged use, there are no side effects completely [13].

Purpose and methods of research. Antagonistic activity of associations of probiotic bacteria was determined by co-cultivation in relation to the culture of Escherichia Coli, Salmonella Abortus Ovis and Proteus Vulgaris.

On dense nutrient media, these pathogens form round colonies of 2-4 mm in diameter, with a smooth, convex surface and a smooth edge. Escherichia on MPA (Meat-Peptone Agar) - the colonies are translucent, grayish. On Levin's medium – they are dark blue, purple, black with or without metallic luster; on Mc-Conkey medium - pink, red (some strains of Escherichia may not ferment lactose and form colorless colonies on the listed media). Proteas and colonies of pathological microorganisms of other serogroups on BGA (Brilliant Green Agar) form pale pink or red-crimson colonies, transparent, surrounded by a brilliant

a) Salmonella Abortus Ovis and *Proteus Vulgaris*

b) Stains of Escherichia, *Salmonella Abortus Ovis* and *Proteus Vulgaris*

c) Stain of *Escherichia Coli*

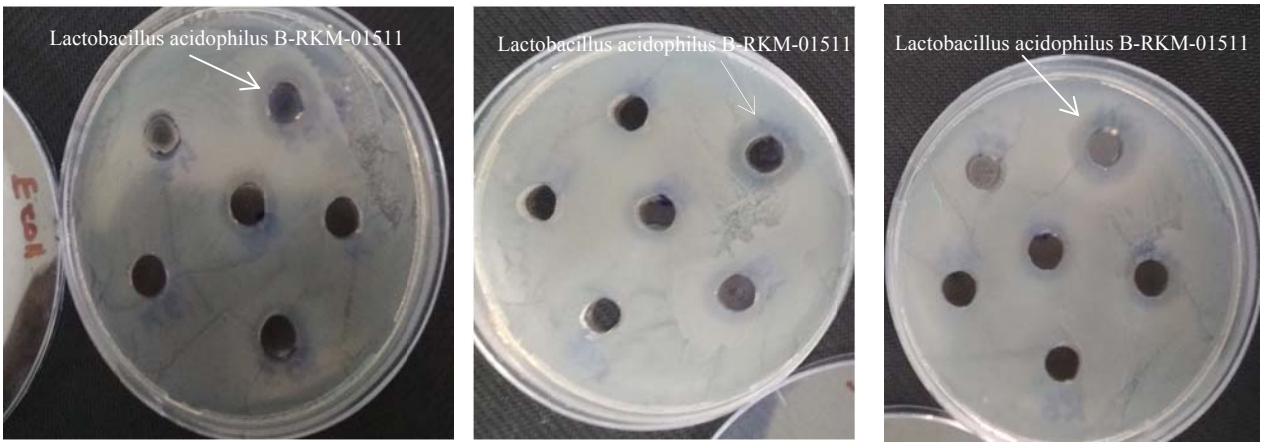
Figure 1 – Colonies of *Escherichia Coli, Salmonella Abortus Ovis and Proteus Vulgaris* on a dense nutrient medium

red halo. Salmonella on BSA (Bismuth Sulphite Agar) usually form black colonies with metallic luster, surrounded by blackening as a result of hydrogen sulfide production and recovery of sulphite to ferrous sulphide, which is black.

For the researches, the deposited passported lactobacillus strain, *Escherichia Coli, Salmonella Abortus Ovis and Proteus Vulgaris,* contained in Lactobacterin-TK^2, were used. Cultivation of the Lactobacillus acidophilus B-RKM-01511 strain of probiotic Lactobacterin-TK^2 was carried out under aerobic conditions at a temperature of 37°C for 24-48 hours in a milk hydrolyzate medium. Enterobacteria were cultured under aerobic conditions at 37°C for 24 hours in Müller Hinton agar medium.

A diffusion well method was used. Separately, 1 ml of cultures of Escherichia Coli, Salmonella Abortus Ovis and Proteus Vulgaris grown within 24 hours were added to sterile Petri dishes, having a titer of 105 microbial cells per ml according to the turbidity standard for opportunistic strains of these bacteria, and then 20 ml of molten and cooled to 40-45°C MPA. When the coating of dishes has harden in the form ofmetal stamp, wells with a diameter of 10 mm were cut out, and 100 µl of probiotic bacteria associations, which are part of Lactobacterin-TK^2, were introduced thereinto. After incubation at room temperature, the dishes were placed in a thermostat (37°C) for 24-48 hours. Then, the diameter of growth inhibition areas of tested microorganisms around the well, including its diameter, was determined.

The results of research of the probiotic activity of Lactobacterin-TK^2 are shown in table.



a) Escherichia Coli,

b) Salmonella Abortus Ovis

c) Proteus Vulgaris,

Figure 2 – Determination by the diffusion method of the well diameters of growth inhibition areas of tested microorganisms

Zone of growth inhibition of the antagonistic activity of the culture of probiotic bacteria Lactobacillus acidophilus B-RKM-01511 against *Escherichia Coli, Salmonella Abortus Ovis and Proteus Vulgaris*

Culture	Antagonistic activity of the probiotic drug (growth ingibition zone in mm)		
	Lactobacillus acidophilus B-RKM-01511		
	Sensibility	Dose-dependent zone	Resistance
Escherichia Coli	≥22	20-21	≤19
Salmonella Abortus Ovis	≥26	23,5-25	≤22,5
ProteusVulgaris	≥21	20-20	≤19

From the data in table it can be seen that the probiotic strain of Lactobacterin-TK^2- Lactobacillus acidophilus B-RKM-01511 has antagonistic activity to strains Escherichia Coli, Salmonella Abortus Ovis and Proteus Vulgaris.

It was found that the strains, which are part of probiotic Lactobacterin-TK^2 are able to show antagonism with regard to *Escherichia Coli, Salmonella Abortus Ovis and Proteus Vulgaris*that determines the high efficacy of the drug.

Results. Made researches have shown that Lactobacterin-TK^2 probiotic strain – Lactobacillus acidophilus B-RKM-01511 has a high antagonistic activity and is able to succeed in the gastrointestinal tract of calves and lambs. The results can serve as a basis for the inclusion of Lactobacterin-TK^2 in the scheme for complex use in the prevention of dysbiotic conditions of the gastrointestinal tract in sick animals.

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БҰЗАУЛАР МЕН ҚОЗЫЛАРДЫҢ АСҚАЗАН-ІШЕК ЖОЛЫ ПАТОЛОГИЯСЫН ТУДЫРАТЫН ПАТОГЕНДІ ШТАММДАРҒА ҚАРСЫ "ЛАКТОБАКТЕРИН-ТК^2" ПРОБИОТИГІНІҢ АНТАГОНИСТІК ҚАСИЕТТЕРІН ЗЕРТТЕУ

Аннотация. Мақалада жаңа туылған бұзаулар мен қозылардың асқазан-ішек жолы қызметінің бұзылуына әкелетін патогенді бактериялардың антагонистік белсенділігі зерттелген.In vitro жағдайында ішектің патогенді микрофлорасына қарсы антагонистік белсенділік зерттелді.

Түйін сөздер: *Escherichia Coli, Salmonella Abortus Ovis, Proteus Vulgaris,* Lactobacterin-TK2, бұзау және қозылар, асқазан-ішек патологиясы, зерттеу.

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ИЗУЧЕНИЕ АНТАГОНИСТИЧЕСКИХ СВОЙСТВ ПРОБИОТИКА «ЛАКТОБАКТЕРИН-ТК^2» НА ПАТОГЕННЫЕ ШТАММЫ ВЫЗЫВАЮЩИЕ ЖЕЛУДОЧНО-КИШЕЧНУЮ ПАТОЛОГИЮ У ТЕЛЯТ И ЯГНЯТ

Аннотация. В статье изучена антагонистическая активность патогенных бактерий, вызывающих расстройство деятельности желудочно-кишечного тракта у телят и ягнят в первые дни жизни. В условиях *in vitro* изучена антагонистическая активность на патогенную микрофлору кишечника.

Ключевые слова: *Escherichia Coli, Salmonella Abortus Ovis, Proteus Vulgaris,* препарат «Лактобактерин-ТК^2», телята и ягнята, желудочно-кишечная патология, исследования.

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MONITORING OF EMISSIONS OF HARMFUL GASES OF INDUSTRIAL OF THE REPUBLIC OF KAZAKHSTAN

Abstract. In article the main environmental problems connected with emissions of harmful substances in the atmosphere are considered. An assessment of impurity of the territory near industrial the enterprise is given. The measures promoting to reduce emission of harmful substances in the environment have been considered. In article the task of determination of content of harmful substances in soils and wood plants and carrying out monitoring is set. As a result a research volumes of pollutants have been determined.

Keywords: harmful gases, environment, industrial, monitoring.

Introduction. One of the main problems of the present is the bad ecological situation in many cities and the countries, modern production is most of all concentrated on satisfying needs of the person.

One of the ecological factors showing the most expressed impact on human health – air deterioration. The harmful blowouts proceeding from production objects and also automobile means have negative impact on air quality. Despite small volumes, they are special danger to the environment and the person as have toxicity which concentration let and in insignificant volume can lead to bad consequences.

One of exits of this situation such actions as gardening of the territory and increase in vegetation in the urbanized cities, reduction of volumes of emissions of harmful substances – a main objective of green production can. If in the twentieth century it was difficult to present use of innovative ways and use of alternative energy sources, then now it is difficult to present a situation without them.

As it was mentioned above, industrial facilities are one of the main sources of emissions of harmful substances in the atmosphere and need of carrying out monitoring of emissions of harmful gases, studying of a condition of air quality in this or that territory and also use of new alternative approaches for the purpose of reduction of volumes of toxic substances in the atmosphere takes place to be.

The purpose of work is the analysis of content of heavy metals in the soil, such as aluminum, iron and fluorine.

The danger of pollution of the soil as risk factor for health of the population is defined by its functional use. In the cities this problem is connected generally with pollution of soils heavy metals. Hygienic researches established quantitative connection between the content of heavy metals in atmospheric air and their loss in the territory of the cities that is fixed by soil anomalies. The soil has high sorption and heat-sink ability, accumulates and violates the geochemical information put by the nature

Methods. Methods of a research of content of harmful substances in the atmosphere and also the content of heavy metals in soils and leaves a plant have a wide range.

Actions for protection of atmospheric air are carried out on a basis widely put research works devoted to studying of quantitative concentration of the pollution getting in atmosphere, and ranges of their distribution. It is established that from the general the number of pollution of 27% 24.3% – arrive from power plants, from the enterprises of ferrous metallurgy, 10.5% – from color, 15.5% – from oil production and petrochemistry, 13.1% – from transport, 8.5% – from the industries of building materials and 1.5% – from other sources.

The main method of a research was by sampling of soils in the city and also in industrial regions of the city.

Figure 1 – The process of sampling of the soil for commission of analyses

Research results. As a result of a research these maintenance of the following basic elements in industrial regions of the city of Pavlodar was received.

The maintenance of such element as aluminum exceeds maximum allowable concentration value. The gross maintenance of this element in the soil makes 8-15%.

The average content of chrome in the industrial region much more exceeds background contents and is in limits of 1-1.34 mg/kg.

One of the following elements is fluorine as we know it a lithophile element and its bigger exceeded contents it was noticed in areas near industrial facilities and makes – 21-23 mg/kg.

Ratio of content of elements in industrial raona of the city to the background maintenance of elements

Name of an element	The average content of an element in city (mg/kg)	The average content of an element in industrial zones (mg/kg)
Chrome	0,33-0,4	1-1.34
Fluorine	11-13	21-23
Iron	90-110	190-230

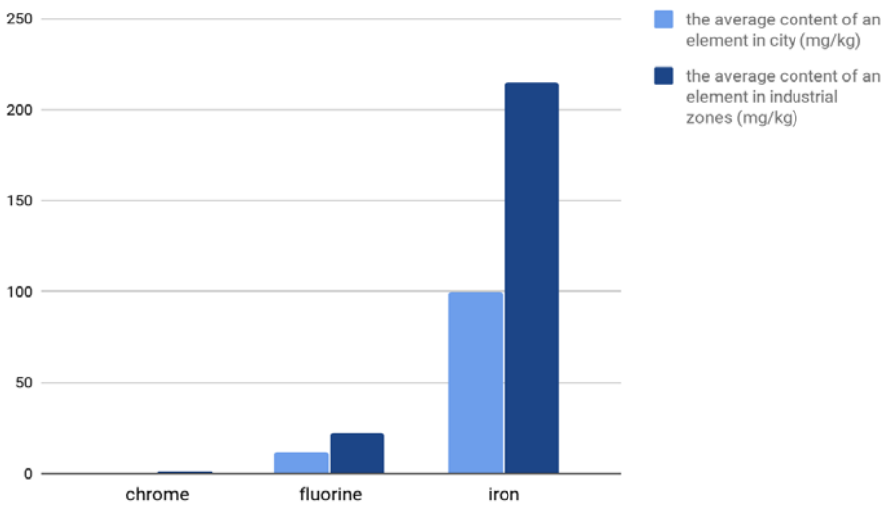

Figure 2 – Ratio of content of elements

Near the industrial zone, also around the airport the maintenance of the following element as iron reached point of 190-230 mg/kg. As far as we know, iron one of enough widespread elements in the nature.

Conclusion. As a result of a research it was revealed that territories, adjacent to the industrial enterprises have bad quality atmospheric air as in the contents have in bigger volume components of heavy metals.

Sources of pollutants are various, also numerous types of waste and nature of their impact on biosphere components. Biosphere becomes soiled solid waste, gas emissions and sewage steel, metalworking and engineering plants.

The high content of toxic elements in the soil and the atmosphere has negative impact on human health and therefore the question of reduction of volumes of harmful substances is always relevant.

Measures for prevention of air pollution are such as:

- establishment of filters for production objects;
- the translation of cars from gasoline on gas;
- use of alternative energy sources;
- sorting of waste, etc.

With increase in population on the planet grows energy consumption. Therefore studying of a question of technogenic loading on the urbanized territories is relevant at all times.

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ҚАЗАҚСТАН РЕСПУБЛИКАСЫНЫҢ ӨНДІРІСТІК АЙМАҚТАРЫНЫНАН ШЫҚҚАН ЗИЯНДЫ ГАЗДАР ШЫҒАРЫНДЫЛАРЫНЫҢ МОНИТОРИНГІ

Аннотация. Мақала зиянды заттардың атмосфераға шығарылуына байланысты негізгі экологиялық мәселелерді талқылайды. Өнеркәсіп кәсіпорындарының аумағының ластануына баға берілді. Қоршаған ортаға зиянды заттардың шығарылуын азайту шаралары қарастырылды. Мақалада топырақ пен ағаш өсімдіктеріндегі зиянды заттардың мазмұнын анықтау және мониторинг жүргізу міндеті қойылған. Зерттеу нәтижесінде ластаушы заттардың саны анықталды.

Түйін сөздер: зиянды газдар, қоршаған орта, өндіріс, мониторинг.

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МОНИТОРИНГ ВЫБРОСОВ ВРЕДНЫХ ГАЗОВ ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ РЕСПУБЛИКИ КАЗАХСТАН

Аннотация. В статье рассматриваются основные экологические проблемы, связанные с выбросами вредных веществ в атмосферу. Дана оценка загрязненности территории близ промышленных предприятий. Были рассмотрены меры, способствующие уменьшить выброс вредных веществ в окружающую среду. В статье ставится задача определения содержания вредных веществ в почвах и древесных растениях и проведения мониторинга. В результате исследований были определены объемы загрязняющих веществ.

Ключевые слова: вредные газы, окружающая среда, производство, мониторинг.

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THE EFFECT OF IRRIGATION REGIME ON THE YIELD OF SOYBEAN IN THE SOUTH AND SOUTH-EAST OF KAZAKHSTAN

Abstract. The quantitative indicators of irrigation norms depend on soil-hydrological features and climatic conditions of the region.

The highest yields in both zones were obtained with drip irrigation and wide range of two-line sowing, it is 51.6 c/ha in the conditions of the Kyrgyz Alatau, and it is 54.6 c/ha in the conditions of the Ili Alatau. The lowest yields were obtained with furrow irrigation in a wide range of single-line sowing.

Key words: irrigated agriculture, drip irrigation, soybean, total water consumption, irrigation norm.

Introduction. Cultivated crops require moisture, the bulk of which they are extracted from the soil, for the normal growth and development. According to many authors, soil moisture has the greatest availability for plants, close to the lowest moisture content. Moisture, as noted by many researchers, is one of the main and indispensable factors of plant life [1].

The irrigation regime of agricultural crops is a set of norms, number and terms of irrigation of each crop in the irrigated crop rotation in accordance with climatic, soil, agrotechnical, hydrogeological conditions of the geographical zone. It should meet the needs of plants in water during all periods of growth and development, taking into account the requirements of agricultural culture; to carry out optimal regulation of water and related nutrient, salt and thermal regimes of the soil; to promote soil fertility; to be linked with the technique and technology of irrigation [2].

Irrigation rationing and timing of irrigation are the main stages of resource-saving technology of cultivation, allowing obtaining the planned grain yields of soybeans, and are also a positive impact on irrigated areas [3].

Obtaining high yields of soybeans is complicated by unstable provision of the territory with atmospheric precipitation. In these conditions [4], irrigation plays a crucial role in the complex of agricultural activities for the cultivation of this crop. Irrigation regime is zonal in nature and it depends on soil-hydrological and weather conditions, method and technique of irrigation [5].

Materials and results. Zhambyl region is a part of the Shu-Talas water basin (WB), which consists of: Shui WMD (code 08.01.14) with three water management areas (codes 08.01.14.01, 08.01.14.02 and 08.01.14.03), Talas WMD (code 08.02.15) with two WMA (codes 08.02.15.01 and 08.02.15.02).

Placement of water management areas and sites, administrative areas and areas of the Shu-Talas WB on natural zones of moisture are given in table 1 and in figure 1.

Total water consumption and irrigation norm. Total water consumption is the total water consumption by the field for evaporation from the soil surface and transpiration of plants during the growing season. Water consumption consists of the moisture reserve of their soil used by plants, atmospheric

Table 1 – Location of WMD and WMA, administrative regions and districts
by natural and corresponding agro-climatic zones of moisture in the Shu-Talas water basin

The name of the water management districts, the code	Code of water management areas	Natural areas and coefficient of moisture (CM)	Administrative areas and districts
08 Shu-Talas water basin			
Shuy 08.01.14	08.01.14.01	Foothill semidesert – FSD, CM=0,25-0,20	Zhambyl region: Korday
	08.01.14.02	Foothill semidesert – FSD, CM =0,25-0,20	Merke, named after T. Ryskulov
		South desert – SD, CM=0.15-0.10	Shusky
	08.01.14.03	Foothill semidesert – FSD, CM=0,25-0,20	The Western part of the district T. Ryskulov
		South desert – SD, CM=0.15-0.10	Moyinkum, Shuy, the southern part of Merke the district after T. Ryskulov
		South desert – SD, CM=0.15-0.10	South Kazakhstan region: Sozak
Talas 08.02.15	08.02.15.01	Foothill semidesert – FSD, CM =0,25-0,20	Zhambyl region: Bayzak
		South desert – PU, Ku=0.15-0.10	Talas, South of Baizak, Zhambyl and Zhualy districts
	08.02.15.02	Foothill steppe – FS, CM=0,30-0,35	Zhualy
		Foothill semidesert – FSD, CM =0,25-0,20	Zhambyl, Zhualy, Sarysu
		South desert – SD, CM=0.15-0.10	Sarysu, Talas

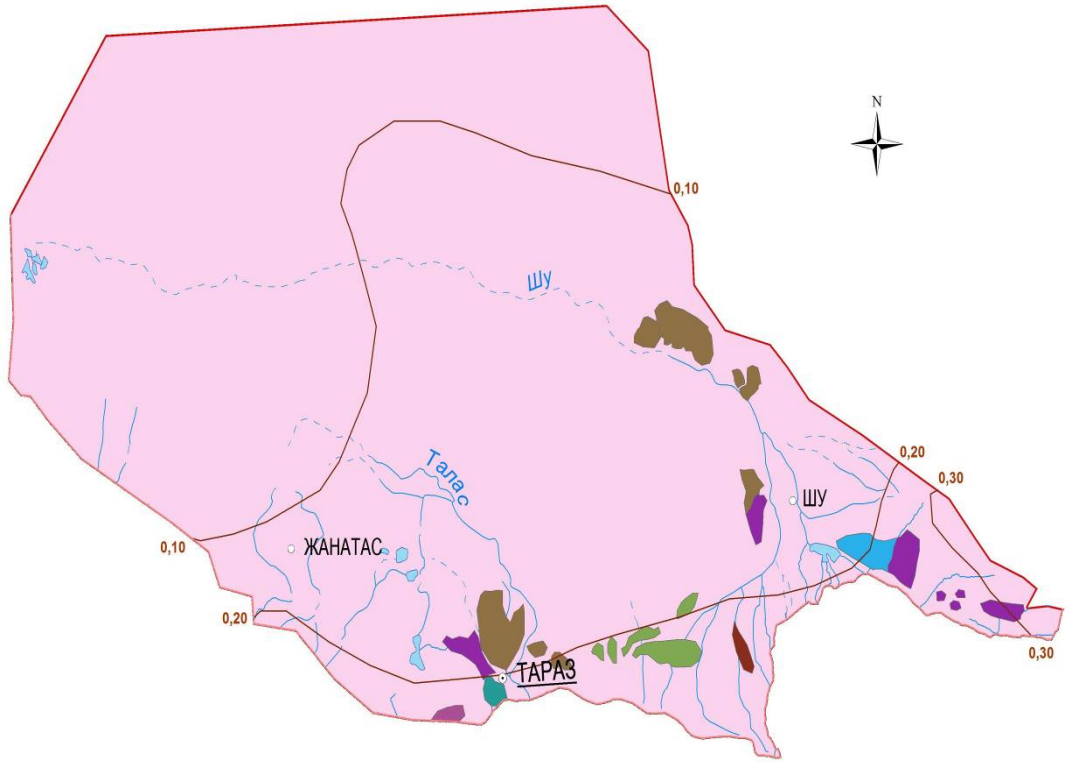

Figure 1 – Shu-Talas water basin

precipitation of the vegetation period, capillary recharge of groundwater (with their close occurrence) and irrigation water.

Evapotranspiration (total water consumption) is established by bioclimatic method according to the dependence of:

$$ET_{crop}=K_oK_v\ ET_o, \quad (1)$$

where ET_{crop} – crop evapotranspiration in m^3/ha; K_o – microclimatic coefficient; K_v – biological coefficient characterizing the role of plants; ET_0 – evaporation over monthly time intervals, determined by the formula N. N. Ivanova:

$$E=0.018(25+t)\ 2\ (100-a),\ m^3/ha, \quad (2)$$

where, t is air temperature, °C; a is relative humidity, %.

Irrigation norm is defined as the difference between evapotranspiration (total water consumption) of agricultural crop and its natural moisture supply. In irrigated areas with deep groundwater tables (>3 m) non-saline soils and its value were set according to:

$$M= ET_{crop} - W_a - P_{ef}, \quad (3)$$

where M is irrigation norm (net) on non-saline soils at deep (>3 m) groundwater table, m^3/ha; ET_{crop} is the evapotranspiration of agricultural crops, m^3/ha; W_a is productive reserves of soil moisture used by plants, m^3/ha; P_{ef} is precipitation during the growing season, m^3/ha.

Irrigation norms, that take into account soil-reclamation and hydrogeological conditions of the irrigated field, were established according to the following dependence:

$$M_{(n.м.)} = \frac{M - ET_{crop} \cdot K_г}{K_м}, \quad (4)$$

where M (p. m.) is the ecological irrigation rules providing for reclamation prosperity on irrigated land, m^3/ha; M is the irrigation net norm, for non-saline soils with deep (>3.0 m) the occurrence of groundwater, m^3/ha; ET_{crop} is total water consumption (evapotranspiration) of crops, m^3/ha; Kg is coefficient of permissible use of groundwater for subirrigation.

2. Water consumption norms of agricultural crops are adopted according to table 40 of "Integrated water consumption and sanitation norms in agriculture" and are given in table 2.

Table 2 – Aggregated norms of water consumption of soybean under drip and surface irrigation in Shuy water area 08.01.14, water sector 08.01.14.02

Cu, natural areas	Irrigated crops	Water consumption norms, m^3/ha								
		Soil-hydrogeological areas								
		automorphic, Groundwater>3 m			semihydromorphic, UHF=2-3 m			hydromorphous, UHF=1-2 m		
		Probability of exceedance, %								
		50	75	95	50	75	95	50	75	95
0,25-0,20, FSD	*Surface irrigation*									
	Soybean	4300	4950	6100	3050	3700	4850	2150	2800	3900
	Drip irrigation									
	Soybean	3400	3900	4850	2400	2950	3850	1700	2200	3100

Thus, the water consumption (m^3/ha) of soybean under drip and surface irrigation in Shuy water management region depends on the features of soil-hydrogeological state, i.e. in both cases the norms decrease with increasing hydromorphism. At the same time, the water consumption rate for drip irrigation is 900-1250 m^3/ha less than for surface irrigation.

Almaty oblast is part of the Balkhash-Alakol water basin (code 02) include water chemistry Ili (code 02.01.07) with seven water stations (codes with 02.01.02.01 for 02.01.02.07), Karatal-Aksu water

chemistry (code 02.02.03) two VAS (codes 02.02.03.01 and 02.02.03.02), Alakol-Sarykolsky water chemistry (code 02.03.00) two VAS (codes 02.03.00.01 and 02.03.00.02) and North Pribalkhashsky water chemistry (code 02.04.00) with one of VAS (code 02.04.00.00).

The location of the water chemistry and VAS, administrative regions and districts by natural zones of moisture are shown in table 3 and figure 2 (contour, Well built according to the SMS, not more than 1000 m above sea level).

Table 3 – Location of WCR and HCU, administrative regions and districts by natural and corresponding agro-climatic zones of moisture in the Balkash-Alakol water basin

The name of the water management districts, the code	Code of water management areas	Natural areas and coefficient of moisture (CM)	Administrative areas and districts
02 Balkash-Alakol water basin			
Ili 02.01.02	02.01.02.01	Mountain steppe – MS, CM=0,55-0,60	Almaty region: Raiymbek, river basin Tekes
	02.01.02.02	Foothill steppe – FS, CM=0,35-0,40	Uighur, southern part
		Foothill semidesert – FSD, CM=0.20 to 0.25	The Uighur, a central part
		South desert - SD, CM=0.10-0.15	Uighur, Northern part
	02.01.02.03	Foothill steppe – FS, CM=0,35-0,40	Panfilov, Northern part
		Foothill semidesert – FSD CM=0.20 to 0.25	Panfilov Central part
		South desert - SD, CM=0.10-0.15	Panfilov, southern, Kerbulak, southern Talgar, Shengeldy array
	02.01.02.04	Mountain steppe – MS, CM=0,55-0,60	Raiymbek, the basin of the river Kegen
	02.01.02.05	Foothill steppe – FS, CM=0,35-0,40	Southern parts of Enbekshikazakh, Talgar, Karasay districts
		Foothill semidesert – FSD CM=0.20 to 0.25	Central parts of Enbekshikazakh, Talgar, Karasay districts
		South desert - SD, CM=0.10-0.15	Northern parts of Enbekshikazakh, Talgar, Karasay districts
	02.01.02.06	South desert - SD, CM=0.10-0.15	Balkhash, the North-Western part of the Karasai district
	02.01.02.07	Foothill semidesert – FSD CM=0.20 to 0.25	Zhambyl, southern part
		South desert - PU, Ku=0.10-0.15	Ili, Zhambyl, Northern part
		South desert - SD, CM=0.10-0.15	Zhambyl oblast: Moyinkum and Shuy districts
Karatal-Aksu 02.02.03	02.02.03.01	South desert - SD, CM=0,15-0,20	Almaty region: Karatal district
		Foothill semidesert – FSD CM=0.20 to 0.25	Koksu, Eskeldy, Kerbulak, the Northern part
	02.02.03.02	South desert - SD, CM=0,15-0,20	Aksu, Sarkand
		Foothill semidesert – FSD CM=0.20 to 0.25	
Alakol- Sasykkol 02.03.00	02.03.00.01	Foothill semidesert – FSD CM=0.20 to 0.25	Almaty region: the Eastern part of the Alakol district
		South desert - SD, CM=0,15-0,20	
		Northern desert - ND, CM=0,15-0,20	East Kazakhstan region: Eastern part of Urzhar district
		Foothill semidesert – FSD CM=0.20 to 0.25	
	02.03.00.02	Foothill semidesert – FSD CM=0.20 to 0.25	Almaty region:Western part of Alakol district
		South desert - SD, CM=0,15-0,20	
		Northern desert – ND, CM=0,15-0,20	East Kazakhstan region: Western part of Urzhar district
		Foothill semidesert – FSD CM=0.20 to 0.25	
North Balkash 02.04.00	02.04.00.00	South desert - SD, CM=0.10-0.15	Zhambyl region: North-Eastern part of Moyinkum district
		North desert – ND, CM=0.10-0.15	Karaganda region: southern part of Aktogay district
		Northern desert – ND, CM=0,15-0,20	Almaty region: North-Western part of Alakol district
		Semi-desert – SD, CM=0,25-0,20	East Kazakhstan region: Ayagoz district

Figure 2 – Balkash-Alakol water basin

Water consumption norms of agricultural crops are adopted according to table 40 of "Integrated water consumption and sanitation norms in agriculture" and are given in table 4.

Table 4 – Aggregated norms of water consumption of soybean under drip and surface irrigation water management in the Ili district water area 02.01.02, water sector 02.01.02.05

CM, natural zone	Irrigated crops	Water consumption norms, m^3/ha								
		Soil-hydrogeological areas								
		automorphic, Groundwater>3 m			semihydromorphic, UHF=2-3 m			hydromorphous, UHF=1-2 m		
		Probability of exceedance, %								
		50	75	95	50	75	95	50	75	95
0,25-0,20, FSD	*Surface irrigation*									
	Soybean	4050	4700	5800	2600	3200	4200	1550	2000	3000
	Drip irrigation									
	Soybean	3200	3700	4600	2050	2550	3350	1250	1600	2350

Quantitative indicators of water consumption (m^3/ha) also depend on the characteristics of the soil-hydrological state, the greater the hydromorphism, the less irrigation norms in the Balkhash-Alakol basin in the Ili water management region. At the same time, the water consumption rate in the Shuy water management region as a whole is 200-300 m^3/ha higher than in the Ili water management region due to the arid climatic conditions of the region.

Table 5 – Comparative assessment of the elements of productivity, yield and quality of soybean seeds of the Lastochka variety depending on the methods of sowing and irrigation

Irrigation method	Method of sowing, aisles, cm	Yield, c/ha	Protein, %	Fat, %
Kyrgyz Alatau				
Drip irrigation	45	49,6	40,2	19,8
	50x20	51,6	39,8	19,5
Furrow irrigation	45	41,5	40,1	20,1
	50x20	43,6	40,6	20,4
Ili, hospital (Kaz NIACP)				
Drip irrigation	45	52,6	39,1	19,2
	50x20	54,6	39,6	19,5
Furrow irrigation	45	44,5	39,4	19,8
	50x20	46,6	39,8	19,2

The results of studies to assess the elements of productivity and quality of soybean seeds cultivated with drip and surface irrigation in the areas of Kyrgyz Alatau of Zhambyl region and Ili Alatau of Almaty region showed that these indicators were more aligned and were within their genetic limits.

At the same time, there is a fairly high stability despite the conditions of their cultivation both in terms of large-scale and quality. The level of protein in the variety Lastochka was within 39.1-40.6% and fat was 19.2-20.4%.

It is known that the integral indicator is the productivity of cultures. This figure varies depending on the conditions of cultivation. The highest yields in both areas of the experiments were obtained by drip irrigation on a wide range two-line sowing. It is 51.6 c/ha in the conditions of the Kyrgyz Alatau, and 54.6 c/ha in the conditions of the Ili Alatau. The lowest yields were obtained by furrow irrigation on a wide range two-line sowing.

Conclusion. The studies done in the Shu-Talas Water basin of Zhambyl region and Balkhash-Alakol basin of Almaty region revealed that the quantitative indicators of the irrigation norm (m^3/ha) depend on the characteristics of the soil-hydrological state (the more hydromorphic, the less than the norm), the agro-climatic conditions of the region (the drier, the more irrigation standards).

The highest yields were obtained by drip irrigation on a wide range two-line sowing in both zones. It is 51.6 c/ha in the conditions of the Kyrgyz Alatau, and 54.6 c/ha in the conditions of the Ili Alatau. The lowest yields were obtained by furrow irrigation on a wide range single-line sowing.

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ҚАЗАХСТАННЫҢ ОҢТҮСТІК ЖӘНЕ ОҢТҮСТІК-ШЫҒЫС АЙМАҒЫНДА СУ РЕЖИМІНІҢ МАЙБҰРШАҚ ДАҚЫЛЫНЫҢ ӨНІМДІЛІККЕ ӘСЕРІ

Аннотация. Суару жылдамдығының сандық көрсеткіштері аймақтың топырақ-гидрологиялық қасиеттеріне және климаттық жағдайларына байланысты.

Екі аймақта жоғары өнімділік Қырғыз Алатауының 51,6 ц/га жағдайында тамшылап суару және кең жолақты екілік егістік алынды, ал Іле Алатауының жағдайында – 54,6 ц/га Төменгі өнімділік көрсеткіші далалық алқапта қарықпен суару арқылы алынған.

Түйін сөздер: суармалы егіншілік, тамшылатып суару, майбұршақ, жалпы су тұтыну, суару жылдамдығы.

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ВЛИЯНИЕ РЕЖИМА ОРОШЕНИЯ НА УРОЖАЙНОСТЬ СОИ НА ЮГЕ И ЮГО-ВОСТОКЕ КАЗАХСТАНА

Аннотация. Количественные показатели оросительной нормы зависят от почвенно-гидрологических особенностей и климатических условий региона.

Наивысшие показатели урожайности в обеих зонах получены при капельном орошении и широкорядном двустрочном посеве, в условиях Киргизского Алатау 51,6 ц/га, а в условиях Илийского Алатау – 54,6 ц/га. Самые низкие показатели урожайности получены при бороздковом поливе в широкорядном однострочном посеве.

Ключевые слова: орошаемое земледелие, капельное орошение, соя, суммарное водопотребление, оросительная норма.

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USE OF LABOR AS THE MAIN ECONOMIC FACTOR

Abstract. The mechanism of regulation and use of labor resources on the basis of improving the organization of production was reviewed. The article reflects the state employment policy of the population as part of the socio-economic policy aimed at solving the problem of employment by increasing the effectiveness of employment programs, developing a system of social partnership, encouraging the mobility of the economically active population and enhancing the flexibility of the labor market. The experience of foreign countries, in particular the People's Republic of China (PRC), in which the agrarian reform is aimed at supporting the development of small and medium-sized businesses, the implementation of a program of using substantial investments in the development of primary education, health care, and the state services system, is considered. It is revealed that the model of the domestic labor market should be based on the use of the most acceptable elements, taking into account the advantages of the country.

The mechanism of functioning of the labor market in the agricultural sector should be considered in the totality of forms, methods for implementing the economic laws of reproduction of the labor potential of the village, the relations of interaction between the demand and supply of labor. Self-employment is considered as a form of employment that unites an employee and an employer in one person, as a form of mitigating labor contradictions of interests - a family business, workers of cooperatives and the advantage of this form of employment can be defined in the freedom to choose a sphere, independent business activity, free work schedule, reliance on one's own initiative, direct dependence of earnings on the income of the enterprise.

Keywords: labor resources, mechanism, conditions, enterprises, use, region, support, population, self-employment, forms.

Introduction. Labor resources as well as natural, financial and capital are the main economic factors. Labor resources include people engaged in economic activities in various industries, and unemployed,but capable of work.

Solving the problem of providing the population with food depends to a decisive extent on the efficiency of the use of labor resources. Due to the high availability of labor, insufficient development of labor-intensive industries, concentration, specialization of production, as well as other factors, in some regions a certain part of labor is not used, and a significant part is used inefficiently. The fundamental issue of economic recovery based on the full and effective use of labor resources is the improvement of the organization of production, taking into account the existing significant zonal differences [1].

For a country, given its regional and geopolitical features, issues of employment and use of labor resources are of particular importance. The regions are characterized by a sharp difference in the conditions that determine their production capabilities: the availability of agricultural land resources and their bioclimatic potential; the condition of the material and technical base of production and processing of agricultural products; the development of a transport system providing links with food suppliers and consumers in other regions and countries; the level of purchasing power of the population; regional and national traditions of food consumption, as well as the ability to meet the demand for it through its own production [2].

Research methodology. In modern conditions, a mechanism for regulating the labor supply of enterprises and the search for ways to improve the efficiency of the use of labor resources are required, which is of tremendous political and socio-economic importance.

The regional economy needs a mechanism for regulating and improving the efficiency of use of labor resources of enterprises, business entities, which makes it possible to solve many socio-economic issues [3]. This mechanism is necessary for: increasing production; implementation of full employment; creating favorable conditions for the life of workers; recruitment, training and retraining; rational balance of production resources and their use; connections to the emerging labor market; rural development, stabilization of the rural population, preservation of folk traditions.

The study of resources for labor activity is of great importance in assessing the labor market and the conduct by the state of an appropriate demographic policy in order to influence the processes of reproduction of the population and its employment [4].

The state employment policy is part of the social and economic policy of the state, aimed at resolving employment problems in the economy through improving the efficiency of employment programs, developing a social partnership system, encouraging the mobility of the economically active population and increasing labor market flexibility.

Results. The study of labor market indicators makes it possible to judge the effectiveness of state policies in the field of employment regulation, which is unlawful to consider outside economic processes, which are objective prerequisites for the realization of opportunities, both of an individual and the population as a whole [5].

The agrarian and industrial complex of Kazakhstan for 11 months of 2018 produced goods and services for KZT 4167.6 billion. In January-November 2018, gross output of products and services in the agriculture, forestry and fishery sectors in Kazakhstan increased by 2.9% compared to last year. The highest rates of agricultural production is detected in the Almaty region. The production of products and services in agriculture with indicators ranging from 200 to 400 million tenge was recorded in the regions: Akmola region - 400863.5 million tenge, 9.6% of the total total production, Kostanay region - 376 845.7 million tenge, 9%, Zhambyl region- 248 103 million tenge, 4, 6%, Karagandy region - 245 867.2 million tenge, 5.9%, Pavlodar region - 210 666 million tenge, 4, 5% and Aktobe region - 206 378 million tenge, 5, 5%.

Of particular interest to the Kazakhstani labor market in the agroindustrial complex is the experience of the PRC, where the agrarian reform went beyond the framework of agricultural production. China is characterized by a successful policy to combat unemployment and poverty, which, despite the country's low GDP, reduced the proportion of families below the subsistence level to 6% of the population and, after two decades of economic reforms, the number of people in absolute poverty decreased from 260 to 42 million the following main factors contributed to this: support for the development of small and medium-sized businesses, the implementation of a targeted program to combat severe forms of poverty, the use of significant investments in the development of early education and primary health care, in the state system of services.

Particular attention was paid to the fight against illiteracy, as one of the causes of the poverty of the rural population and, in particular, the youth and women.

The study of the formation of the Kazakhstan model of the labor market showed that at the initial stage of its formation was carried out according to the Swedish model [6].

Then, certain features characteristic of the Japanese model were identified, for example, life-long employment in certain large enterprises. Also, elements of the Japanese model of the labor market include the use of various methods of reducing working hours, weeks, and forced vacation, which, in turn, contributed to the formation of high hidden unemployment in workplaces on a very large scale, especially in rural areas.

The model of the Kazakhstan labor market should be based on the use of the most acceptable elements of each of these models, taking into account the advantages of the republic.

The study of the mechanisms of functioning and regulation of the labor market in the agrarian sphere of the most developed countries led to the following conclusions:

- the mechanism of functioning of the labor market in the agrarian sector should be considered as a set of forms, methods for implementing the economic laws of reproduction of the labor potential of the

village, the relationship between supply and demand of labor, resulting in determining the market price of the commodity-labor force - wages and the equilibrium employment parts of the rural population;

- the functional method of studying the mechanism of the existence of the labor market makes it possible to establish the general level of wages in the agro-industrial complex and the level of rural unemployment and their definition in specific labor markets to competitors;

- the mechanism for regulating the labor market in the agro-industrial sector is an adaptive response of production relations aimed at regulating the contradictions in the functioning of the labor market at various levels: macro, micro, international, regional;

- specific forms of the labor market regulation mechanism in the agrarian sphere are forms of balancing the contradictions in the functioning of the labor market, which develop under the influence of ongoing changes in productive forces and production relations that are often violated, which leads to the manifestation of new ones [7].

By international standards, the share of the employed population in relation to people of working age 15-64 years old in Kazakhstan is at a high level of 73%, which corresponds to the level of the developed countries of the West. This high employment rate is associated with a high proportion of the self-employed population, whose share reaches 25% of the employed population, whereas in developed countries the share of the self-employed accounts for only about 10% of all employed.

The share of the self-employed population has consistently decreased since the beginning of the two thousandths, when it was 45% relative to total employment to 25% by now, while there is no certain numbers about the self-employed.

Self-employment is considered to be a form of employment that unites an employee and an employer in one person, or finds a form of easing labor-related contradictions of interests (family business, employees of cooperatives). As advantages of this form of employment, one can point to the freedom of choice of the sphere and independence of entrepreneurial activity, free work schedules, reliance on one's own initiative, direct dependence of earnings on the income of an enterprise [8]. The spread of self-employment in the world is quite high, for example, in Romania, Turkey, Greece, their share exceeds 30%.

In terms of industry, the share of self-employed reaches 40% in agriculture in Poland, 20% in construction in the UK, 40% in trade in Spain, 20% in professional field, scientific and technical activities in Sweden, 18% in humanitarian services in Germany.

But it is important to note that all self-employed in Western countries pay taxes after paying social payments. In Kazakhstan, for the self-employed, except through individual entrepreneurship, there is no working model for paying taxes because of the low incomes of the self-employed, and here seems to be a problem of rather costly administration of this kind of activity.

At the same time, from 2018, a local government budget is being introduced at the level of a city of district importance, a village, a rural district, and it is possible at this level that it will be easier to identify self-employed people, including through outsourcing of self-employed individual types of work.

In the regions, a significant proportion of self-employed is concentrated in the southern, southeastern and northern regions, where agriculture is widespread, and especially in rural areas, where the share of the self-employed is more than half of all employed.

With the help of the balance of labor resources, sources of the formation of labor, connections and proportions in its distribution by sectors of the economy and types of economic activity between individual regions of the country are discovered [9].

In 2013-2017 in the republic as a whole, the growth of the economically active population in the baseline scenario averaged 127.8 thousand people. At the end of the second half of 2017, the population of Kazakhstan exceeded 18 million people. This reflects the continuing trend of population growth. However, the age structure of the population undergoes significant changes - the working-age population of 15–64 years is decreasing due to the failure of the birth rate and the mass outflow of the population in the 1990s. This is reflected in the reduction in the number of young people aged about 15–25 years old, but is reflected in the increase in children under the age of 15 years old and those over 65 years old.

And by the end of 2017, the number of economically active population was 9.5 million people, with a total population of the Republic of Kazakhstan of 18.16 million people. At the same time, in some regions, due to a reduction in the population, a reduction or a slight increase in the number of economically active population is expected.

These regions include four regions (Akmola, Kostanay, North Kazakhstan, including East Kazakhstan regions).

The growth of the economy and the economically active population led to an increase in the number of employed by the beginning of 2018 to 9.16 million people. For comparison, by the end of 2014, their number was 8.54 million people. The increase in the number of people employed by region is uneven. This is due to the various expected demographic trends and development indicators. The largest growth in the number of employed is observed in Astana (107 thousand people as of January 1, 2018), the smallest - in the North Kazakhstan region (2.7 thousand people), in East Kazakhstan 61.6 thousand people. Analysis of labor resources in individual regions corresponds to the development of labor resources in the country. For example, the East Kazakhstan region is one of the promising regions of Kazakhstan and has a developed infrastructure. The basis of its economy are the mining industry, the metallurgical and machine-building industries, as well as the agricultural sector of the economy, there are great opportunities for the development of tourism.

In connection with these positive changes in the economy of the country's regions that have emerged over the past decade, trends continue to change in the structure of distribution of workers by types of economic activity, such as the mining and manufacturing industries, engineering, agriculture, and the service sector. Against the background of economic growth, an increase in the efficiency of using labor resources and an increase in the share of the self-employed population by 2.4% is expected.

In a number of regions of Kazakhstan, the regional authorized organization for the implementation of the second direction of the Employment Program 2020 is defined by the Fund for Financial Support of Agriculture.

For the current state of economic development, rational distribution of productive forces is of particular importance, allowing us to ensure greater production efficiency, to obtain maximum profit with careful, rational use of natural resource potential, preservation and improvement of the environmental conditions of the population. At the same time, the complex use of natural resources, the introduction of waste-free technologies in the processing of raw materials and fuel are important [10].

With the current location of production in the market conditions, the restructuring of the entire economic system, the socialization of the economy, and the equalization of the levels of economic development of certain regions of Kazakhstan are of particular importance.

Improving the territorial structure of the economy, ensuring a rational combination of economic and social development of each subject, region, should be aimed at improving their interaction in the economic complex of Kazakhstan, the complexity of their development, the formation of territorial-industrial complexes and industrial centers, the rational development of their natural and economic resources.

In the production of agricultural products, it is necessary to take into account the requirements of both biological and general economic laws. An important characteristic of the use of labor resources is the sectoral structure of employment.

The main reason for influencing the efficiency of the use of labor resources is the seasonal nature of agricultural labor. It is caused by the seasonality of production and the discrepancy between the production period and the working period. Reducing annual seasonality and improving the use of labor resources can be achieved: by improving the sectoral structure of production, taking into account regional and sectoral conditions; development of subsidiary industrial productions and crafts; improvement of economic incentives for workers and the development of entrepreneurial activities in rural areas [11].

An important direction of the state active policy of employment and social support for persons left out without work is professional training of the population. Conducting a variety of training activities improves the professional qualities of workers, enhances the competitiveness of the non-working population through training new occupations, advanced training and retraining based on the situation on the labor market.

Limited employment in rural areas, low territorial and socio-professional mobility of the rural population, poor social protection for the unemployed hamper the process of optimizing the level and structure of employment. [12]. The dynamics of the labor market over the past years shows that the greatest regional differences in the level of unemployment occurred at the very beginning of the reforms (in 1992), but by the beginning of the 21st century there was some stabilization and decrease in this indicator.

One of the most effective forms of using industrial, labor, material resources of a village is a rural industrial enterprise, the main functions of which can be: the development of local raw materials; effective use of the production potential of the territory; reducing unemployment by creating new jobs; strengthening the rural economy; an increase in the rate of accumulation and savings. By the nature of their activities, rural industrial enterprises can be divided into such types as industrial, construction, transport, trade, and service [13, 14].

When combined with the development of agriculture and industrial production, its profitability increases manifold due to a more rational use of the industrial, labor and raw material resources of the village. As a result of a combination of various occupations, the labor of agricultural workers over the course of a year becomes relatively uniform. [15] Easy labor change occurs where there are handicraft, processing, or industrial enterprises.

Findings. The combination of the production and processing of agricultural raw materials directly at the places allows reducing costs, reducing losses, especially of perishable and untransportable products. Waste from recycling is disposed of as animal feed or fertilizer. Integration also provides an opportunity to get rid of intermediaries in the transportation of agricultural raw materials and products. The creation of industrial enterprises can be one of the most effective areas of agricultural growth and integrated rural development.

With the current disparity in the prices of products, agriculture currently cannot develop independently at a high rate, the village has practically no resources for this. That is why the creation of industry in the countryside can be one of the factors for the rise of agriculture, the improvement of the well-being of rural residents, and the strengthening of rural society. The combination of rural and industrial activities offers great opportunities for increasing investment in the development of agricultural production itself.

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ЕҢБЕК РЕСУРСТАРЫН БАСТЫ ЭКОНОМИКАЛЫҚ ФАКТОР РЕТІНДЕ ПАЙДАЛАНУ

Аннотация. Өндірісті ұйымдастыруды жетілдіру негізінде еңбек ресурстарын реттеу және пайдалану механизмі қарастырылған. Жұмыспен қамтуды қамтамасыз ету бағдарламаларының тиімділігін арттыру, әлеуметтік әріптестік жүйесін дамыту, экономикалық белсенді халықтың ұтқырлығын ынталандыру және еңбек нарығының икемділігін күшейту жолымен халықты жұмыспен қамту мәселелерін шешуге бағытталған әлеуметтік-экономикалық саясаттың бір бөлігі ретінде халықты жұмыспен қамтудың мемлекеттік саясаты көрсетілген. Шет елдердің, атап айтқанда, ҚХР тәжірибесі қаралды, онда аграрлық реформа шағын және орта бизнесті дамытуды қолдауға, бастауыш білім беруді, денсаулық сақтауды дамытуға, мемлекеттік қызмет көрсету жүйесіне елеулі инвестицияларды пайдалану бағдарламасын жүзеге асыруға бағытталған. Отандық еңбек нарығының моделі елдің артықшылықтарын ескере отырып, неғұрлым қолайлы элементтерді пайдалануға негізделуі тиіс екені анықталды.

Ауыл шаруашылығы саласындағы еңбек нарығының жұмыс істеу механизмін ауылдың еңбек әлеуетін ұдайы өндірудің экономикалық заңдарын іске асыру нысандары мен әдістерінің, жұмыс күшінің сұранысы мен ұсынысы арасындағы өзара іс-қимыл қатынастарының жиынтығында қарау қажет. Өзін-өзі жұмыспен қамту қызметкердің және жұмыс берушінің бір тұлғаны біріктіретін жұмыспен қамту нысаны ретінде, мүдделердің еңбек қайшылықтарын жеңілдету нысаны ретінде-отбасылық бизнес, кооперативтердің қызметкерлері және осы жұмыспен қамту нысанының артықшылығымен саланы таңдау бостандығында, кәсіпкерлік қызметтің тәуелсіздігін, еркін жұмыс кестесін, өз бастамашылығына сүйеніп, табыстың кәсіпорын кірісіне тікелей тәуелділігін анықтауға болады.

Түйін сөздер: еңбек ресурстары, механизм, шарттар, кәсіпорындар, пайдалану, аймақ, қолдау, халық, өзін-өзі жұмыспен қамту, нысандар.

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ИСПОЛЬЗОВАНИЕ ТРУДОВЫХ РЕСУРСОВ КАК ГЛАВНОГО ЭКОНОМИЧЕСКОГО ФАКТОРА

Аннотация. Рассмотрен механизм регулирования и использования трудовых ресурсов на основе совершенствования организации производства. Отражена государственная политика занятости населения как части социально-экономической политики, направленной на решение проблемы занятости населения путем повышения эффективности программ обеспечения занятости, развития системы социального партнерства, стимулирования мобильности экономически активного населения и усиления гибкости рынка труда. Рассмотрен опыт зарубежных стран, в частности КНР, в которой аграрная реформа направлена на поддержку развития малого и среднего бизнеса, осуществление программы использования существенных инвестиций в развитие начального образования, здравоохранения, в государственную систему услуг. Выявлено, что модель отечественного рынка труда должна быть основана на использовании наиболее приемлемых элементов с учетом преимуществ страны.

Механизм функционирования рынка труда в сельскохозяйственной сфере необходимо рассматривать в совокупности форм, методов реализации экономических законов воспроизводства трудового потенциала села, отношений взаимодействия между спросом и предложением рабочей силы. Рассмотрена самозанятость как форма занятости, объединяющей работника и работодателя в одном лице, как форма смягчения трудовых противоречий интересов – семейный бизнес, работники кооперативов и преимуществом этой формы занятости можно определить в свободе выбора сферы, независимости предпринимательской деятельности, свободном графике работы, опоре на собственную инициативность, прямой зависимости заработка от дохода предприятия.

Ключевые слова: трудовые ресурсы, механизм, условия, предприятия, использование, регион, поддержка, население, самозанятость, формы.

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RESEARCH OF TRANSFORMATION OF BIOGENOUS ELEMENTS IN WATER ECOSYSTEMS OF THE SOUTHERN ARAL SEA AREA

Abstract. The mathematical imitating model which considers spatial transfer of biogenic elements for water ecosystems is presented. The model can be used for forecasting and the solution of problems of protection and rational use of natural water resources of Southern Aral Sea Area. The used mathematical simulation model also considers spatial transfer of components of phosphorus a water flow and with its help it is possible to estimate correctly the main components of receipt and account balance of phosphorus for the studied water ecosystem. The role of internal and external flows in forming of balances of separate forms of phosphorus is various. In small reservoirs intake of phosphorus from ground deposits makes direct impact on a reservoir eutrophication. It is established that intraspecific distribution of speeds of biochemical transformation P is determined in no small measure by temperature and transparency of water, and also illumination of a surface of the water.

Key words: water ecosystems, Southern Aral Sea Area, imitating model, biogenic elements, component, balance, phosphorus, eutrophication.

Introduction. One of the most important indicators of degradation in Southern Aral Sea Area is the deterioration of the water used by the population in the drinking purposes, arising owing to considerable anthropogenous impact on water resources. Considering deficiency of fresh water in Southern Aral Sea Area and universal pollution of water in the Amu Darya River, on all her extent, the Government of the Republic of Uzbekistan has developed a complex of actions for protection of water resources, to increase in water content of some lake systems and transformation of some lakes into lake and pond farms.

Change of the water mode due to natural interannual climatic changes, and also through expected large-scale water management actions can lead to violations of the balances which have developed in reservoirs between receipt and carrying out of biogenous elements and organic substances and from here to such undesirable consequences as process of an eutrophication of reservoirs and deterioration of water resources in general [1].

In recent years because of sharp increase in dumping of nitrogen and phosphorus in reservoirs and waterways, and also as a result of control of a drain of many flat rivers, in them there were peculiar violations of the hydrochemical and hydrobiological mode of reservoirs. Formation of organic substance at intensive development of phytoplankton has increased, for example, and the trophication of reservoirs [11, 5, 6, 2]. Accumulation of the biogenous elements coming to water ecosystems with an agricultural drain promotes accumulation of biogenous elements that leads to formation of a certain mode inherent in eutrophication lakes [2].

Objects and methods. Biotic components of water ecosystems reflect the trophic status of a water object which, in turn, depends on amount of the organic substances dissolved in water. According to it populations, types and communities of organisms have a certain level of tolerance at this conjuncture. There is a set of methods of assessment of a condition of water ecosystems in various parameters. At the same time most of them is applicable not to all categories of water objects and factors of influence. Some

developed methods of the integrated estimates allowing to apply them on any water objects and to assessment of the majority of factors of influence are known [3]. So, for example, the amount of the biogenous substances dissolved in water is an integrated indicator of a condition of waters and water ecosystems in general as it consists of the organic substances which have arisen in the course of activity of the organisms at all trophic levels and also brought from the pool of a reservoir as a result of natural and anthropogenous processes.

Discussion. Eutrophication of many reservoirs first of all it is caused by increase in phosphoric loading. In this regard, we have made an attempt to track regularities of distribution of forms of phosphorus in water, his balance, definition of characteristics of phosphoric loading and streams of his forms in ecosystems by means of imitating model of phosphoric system in the lakes Dautkul and Shegekul – important objects of economic value. The model is based on the principles and methodology of the system analysis: in her variety of forms of finding of substances of a different origin in the water environment, various interactions of components of the chemical and biological nature and influence on them physical, chemical and biological processes are considered. The model, on the one hand, reproduces development of processes of biotransformation and circulation of forms of phosphorus, and with another reflects variability of content of oxygen (an integrated indicator of a condition of the water environment) [7, 12].

The used mathematical simulation model also considers spatial transfer of components of phosphorus a water flow and with its help it is possible to estimate correctly the main components of receipt and account balance of phosphorus for the studied water ecosystem. The role of internal and external flows in forming of balances of separate forms of phosphorus is various. In small reservoirs intake of phosphorus from ground deposits makes direct impact on a reservoir eutrophication. It is established that intraspecific distribution of speeds of biochemical transformation P is determined in no small measure by temperature and transparency of water, and also illumination of a surface of the water. The maximum speed of consumption of DIP phytoplankton constitutes 0,39 mg of R_l year, and allocations – 0,097 mg R_l year. The interactions of the specified forms of phosphorus (R) considered in model constitute a basis of biochemical processes, create a certain mode of functioning of an ecosystem and a general orientation of transformation of phosphorus in a reservoir [9, 10].

Analyzing the received values P, it is possible to note that the main role in external phosphoric loading of the lake belongs to external inflow which arrives in the form of DIP (its receipt with a river drain constitutes 0,197 mg P / (l year), or 70,7% of intake of phosphorus of general. 21,2 and 2,1% are the share of a share of DP and DOP. It is established that among forms of phosphorus DIP (76,4%) dominates. The greatest carrying out of phosphorus a water flow is the share of DIP (50,6%) and of the amount of phytoplankton and bacteria of F+B (23,4%), and also phosphorus in PD detrital (17,3%) and phosphorus of organic DOP (8,7%). Possibly, it is caused by the fact that the above-named part of forms of phosphorus is connected with phytoplankton and bacteria, and a part is taken out with a drain. Especially it should be noted that the main accumulating of forms of phosphorus happens in ground deposits in the form of DIP (94,2%) where its inventories are quite big that the of processes can't but affect nature. Under certain conditions (especially anaerobic, in lack of oxygen) a part of phosphorus is released, thereby, stimulating development of autotrophic organisms, changing the level of production processes that leads to a reservoir eutrophication, that is phosphorus is a material basis of secondary pollution of reservoirs, and ground deposits – the eutrophication microcenters. At the same time, the more phosphorus arrives in the researched reservoir, the more actively in it there are processes of its transformation. Partially it is caused by influence of activity of the community of hydrobionts reacting definitely to fluctuations of external conditions. Change of a ratio of forms of phosphorus in the water arriving in a reservoir and following from it is explained, apparently, by change of conditions of transformation of phosphorus in a reservoir.

Conclusion. Thus, in recent years influence of human activities on water resources sharply amplified. To the main types of economic activity exerting the greatest impact on water resources of the region water consumption for agricultural, industrial and municipal needs, and also dumping's into reservoirs of sewage is. Forming of quality of water in water objects – process difficult, many-sided, depending on a complex of the various factors connected with functioning of water ecosystems and with conditions of a surrounding landscape and a bed of a reservoir [8, 11]. It is established that the existing economic mechanisms of conservation are inefficient first of all because don't create incentives of application of resource- and energy-saving technologies and don't provide sufficient means from payments for emissions and

dumping's, placement of waste and use of natural resources for financing of nature protection activities in required scales. The problem of rational use of water resources of the region of Southern Aral Sea Area purchases the increasing sharpness every year and determines need of holding big organizational and technical actions. Of which can be one such as:

– monitoring system recovery limnic of ecosystems of the region Aral Sea Area;

– creation of the regional inventory of hydrobionts development and deployment of new methods of data collection and processing about a biodiversity, the structurally functional organization and main types of anthropogenous impact on ecosystems of reservoirs;

– implementation of modern GIS of technologies;

Results of the conducted researches allow explaining observed features of functioning of water ecosystems and specificity of dynamics of phosphorus where he acts as one of parts of the trigger in the course of an eutrophication of reservoirs. The model can be used for forecasting and the solution of tasks of protection and rational use of natural water resources of Southern Aral Sea Area.

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ОҢТҮСТІК АРАЛ ӨҢІРІНІҢ СУ ЭКОЖҮЙЕСІНДЕГІ БИОГЕНДІ ЭЛЕМЕНТТЕРДІҢ ТРАНСФОРМАЦИЯСЫН ЗЕРТТЕУ

Аннотация. Мақалада Оңтүстік Арал өңіріндегі су экожүйелерін эвтрофикациялау процестерін зерттеу нәтижелері келтірілген. Фосфор формаларының судағы негізгі таралуы, оның балансы, Оңтүстік Арал өңірінің су экожүйелеріндегі фосфор жүктемесінің сипаттамаларын анықтау есептелді. Қолданылатын математикалық имитациялық модель де фосфор құрауыштарының су ағынына кеңістіктік тасымалдануын ескереді және оның көмегімен зерттелетін су экожүйесі үшін фосфордың түсуінің негізгі құрауыштарын және есептік балансын дұрыс бағалауға болады. Фосфордың жекелеген түрлерінің баланстарын қалыптастырудағы ішкі және сыртқы ағындардың рөлі әртүрлі. Шағын су қоймаларында топырақ шөгінділерінен фосфор алу су айдынының эвтрофикациясына тікелей әсер етеді. Фосфордың биохимиялық айналу жылдамдығының түрішілік бөлінуі судың температурасы мен мөлдірлігімен, сондай-ақ су бетінің мөлдірлігімен анықталады.

Түйін сөздер: су экожүйелері, Оңтүстік Арал өңірі, имитациялық моделдеу, биогенді элементтер, құрауыш, баланс, фосфор, эвтрофикация.

С. М. Мамбетуллаева, А. К. Курбаниязов, Г. Ж. Нургалиева

ИССЛЕДОВАНИЕ ТРАНСФОРМАЦИИ БИОГЕННЫХ ЭЛЕМЕНТОВ В ВОДНЫХ ЭКОСИСТЕМАХ ЮЖНОГО ПРИАРАЛЬЯ

Аннотация. В статье приводятся результаты по исследованию процессов эвтрофикации водных экосистем в Южном Приаралье. Были рассчитаны основные распределения форм фосфора в воде, его баланса, определение характеристик фосфорной нагрузки в водных экосистемах Южного Приаралья. Используемая математическая имитационная модель также учитывает пространственный перенос компонентов фосфора в водный поток и с ее помощью можно правильно оценить основные компоненты поступления и учетного баланса фосфора для исследуемой водной экосистемы. Роль внутренних и внешних потоков в формировании балансов отдельных форм фосфора различны. В небольших водоемах забор фосфора из грунтовых отложений оказывает непосредственное влияние на эвтрофикацию водоема. Установлено, что внутривидовое распределение скоростей биохимического превращения фосфора определяется в немалой степени температурой и прозрачностью воды, а также прозрачностью поверхности воды.

Ключевые слова: водные экосистемы, Южное Приаралье, имитационное моделирование, биогенные элементы, компонент, баланс, фосфор, эвтрофикация.

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NORMALIZATION OF THE ULTIMATE ALLOWABLE LOAD IN THE DRAINAGE BASIN OF THE KARATAL RIVER BASIN

Abstract. Based on the equation of hydro-chemical balance of the water of river basins and iodine factor dependence, which characterizes the relative productivity of semi-submersible water vegetation from river flow and the content of pollutants, a mathematical model has been developed to determine the environmentally acceptable maximum load in the catchments of the river basin, including predicting the concentration of water pollutants in the river, and an acceptable level of non-returnable water consumption and ecological runoff, which are realized for determination of the maximum permissible level of natural-technogenic load in the basin of the river Karatal.

Key words: catchment of the river basin, ecology, water, substance, pollution, norm, productivity, hydro-chemical balance equation, load, model.

Introduction. The progressive pollution of the basins of small rivers as a result of the anthropogenic activities of urban and industrial facilities is one of the most actual problems of modern ecology science. The actuality of the problem is related to the fact that the channels of these rivers take the main technogenic load from agricultural and industrial enterprises - the nature of users who are sometimes at a sufficiently large distance from each other and belong to different administrative-territorial units in the catchment areas of river basins.At the same time, streams perform a transport function and transfer toxic pollutants from some territories located in the upper reaches of the river, on which they were formed and entered into a streams, and on others - adjacent areas located downstream, which are forced to take on this toxic and polluted stream for induced recharge. Thus, the transfer of pollutants is polluting in nature and causes a number of problems not only ecologically, but also regulatory and economic, which requires the need to develop methodological support for determining the ecologically acceptable maximum load in the catchment areas of river basins.

The purpose of the study is to assess the allowable impact level in the catchments of the Karatal river basin and, on the basis of them, to develop a mathematical model to determine the ecological flow, allowable limits for irrevocable water consumption and pollution, ensuring the sustainability of the aquatic ecosystem.

Materials and research methods. Based on the equation of hydrochemical balance of substances in the catchments of river basins and the relative productivity of vegetation from river runoff and the content of pollutants, as a function system allowing to describe the behavior of the aquatic system in a state of stable equilibrium, taking into account the influence of natural and anthropogenic factors, a mathematical model is obtained that characterizes the equation balance of substances, relative to concentration (C_p) [1; 2]:

$$C_p = \frac{g_б \cdot C_б \cdot}{(A \cdot g_б + g_{bon})} + \frac{g_{bon} \cdot (K_b \cdot C_б + K_{nз} \cdot C_б)}{(A \cdot g_б + g_{bon})} - \frac{b_{\max} \cdot S(w) \cdot S(c)}{(A \cdot g_б + g_{bon})},$$

here A - is a dimensionless indicator, characterizing the ratio of the natural flow of the river (flow rate) (Wr) to the volume of river flow ($W_б$); $g_б$ - water flow module from catchment area, l /s·km^2; g_{bon} - module of water demand in thecatchment of the river basin; $C_б$ - specific removal of substance from a unit of

catchment area; b_{max} - the specific maximum volume of substances absorbed by aquatic vegetation per unit volume of water, kg / m3; K_b - ratio of return water; $K_{пз}$ - coefficient of groundwater; $S(w)$ - indicator that takes into account the effect of the volume water in the river on the vegetation productivity; $S(c)$ - indicator that takes into account the effect of pollution in river water by the substance under consideration.

The function $S(w)$ and $S(c)$ characterizing the relative productivity of aquatic vegetation from river flow (W_i) and the content of pollutants (C_i) are one-factor dependencies, having the form of dome-shaped curves, well described by formula V. V. Shabanov [3]:

$$S(\varphi) = \left(\frac{\varphi_i}{\varphi_{opt}} \right)^{\gamma \cdot \varphi_{opt}} \cdot \left[\frac{(1-\varphi_i)}{(1-\varphi_{opt})} \right]^{\gamma \cdot (1-\varphi_{opt})},$$

here $S(\varphi)$ - is a relative productivity of water semi-submersible vegetation; φ_i - the actual value of the considered environmental factor; φ_{opt} - optimal value of the considered environmental factor; γ - parameter of self-regulation of semi-submersible aquatic vegetation.

Thus, the mathematical module characterizing the substance balance equation with respect to concentration (C_p) makes it possible to determine the ecological allowable exposure limits based on the Le Chatelier-Brown principle, which states that «an external influence that brings the system out of balance stimulates processes that tend to weaken the results of this influence».

Results of the study. Based on the developed mathematical model for assessing the ecological allowable limit of natural and man-made impact on the environment of small rivers, a numerical experiment was conducted to determine the maximum allowable level of water use of the Karatal river taking into account not only the volume or discharge of polluted wastewater from cities and industrial facilities, as well as incoming collector-drainage waters from from the territory of irrigated arrays.

In this case, the dependence function of the relative productivity of water semi-submersible vegetation on river flow ($S(w)$) and the content of pollutants ($S(c)$) will be represented as a product of the function ($S(w,c)$): $S(w,c) = S(w) \cdot S(c)$.

Assessment of the relative productivity of semi-submersible aquatic vegetation in the watersheds of the Karatal river basin was estimated at the following values: $\gamma = 5.0$ - the parameter of self-regulation of semi-submersible water vegetation [4]; $\varphi_{opt}^{w} = 0.70$ is the relative optimal value of the permissible limit of the irretrievable water intake; $\varphi_{opt}^{c} = 0.30$ is the relative optimal value of the content of pollutants in the waters of the river basin; $\varphi_i = 0\text{-}1$ is the range of variation of the considered environmental factors (table 1 and figure 1).

Table 1 – Relative productivity of semi-submersible aquatic vegetation in the Karatal river basin

Range of change of the considered environmental factors (φ_i)	Indicators of relative productivity of water semi-submersible vegetation		
	$S(w)$	$S(c)$	$S(w) \cdot S(c)$
0,0	0,000	0,000	0,000
0,1	0,005	0,464	0,002
0,2	0,052	0,864	0,045
0,3	0,185	1,000	0,185
0,4	0,396	0,897	0,355
0,5	0,665	0,630	0,418
0,6	0,896	0,399	0,358
0,7	1,000	0,182	0,182
0,8	0,867	0,054	0,047
0,9	0,463	0,005	0,002
1,0	0,000	0,000	0,000

As can be seen from figure 1, the relative productivity of semi-submersible aquatic vegetation ($S(\varphi)$) depending on the range of variation of the considered environmental factors (φ_i), having the form of dome-shaped curves, shows that their maximum values are located in the zone of optimal values of the environmental factors (φ_{opt}).

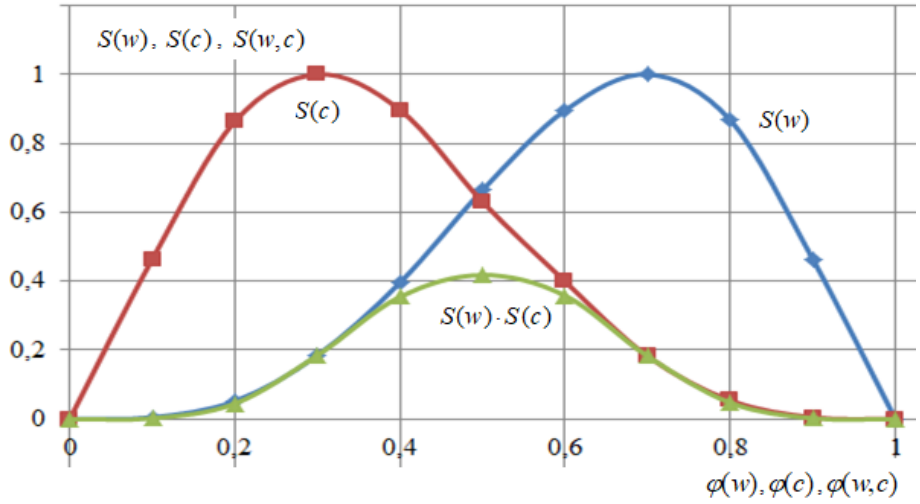

Figure 1 – Relative productivity of semi-submersible aquatic vegetation ($S(\varphi)$) of the Karatal river basin depending on the range of variation of the considered environmental factors (φ_i)

Herewith, the maximum value of the dome-shaped curves of the product of the function ($S(w,c)$), taking into account the combined effect of the volume of water in the river ($S(w)$) and pollution of the river water to certain substances ($S(c)$) is within 0.40, which characterizes the lower limit of the maximum possible value of ecological flow, ensuring the environmental sustainability of natural systems in the watersheds of the river basin.

Based on the use of the hydrochemical balance equation of a river flow substance, that is, the first two terms can be used to assess the external impact on the river ecological system, denoting them as a certain concentration (C_{pm}), characterizing the effects of natural and man-made activities that have formed intrawater processes where water self-purification occurs river basins [1]:

$$C_{pm} = \frac{g_б \cdot C_б}{(A \cdot g_б + g_{bon})} + \frac{g_{bon} \cdot (K_b \cdot C_б + K_{пз} \cdot C_б)}{(A \cdot g_б + g_{bon})},$$

here C_{pm} - concentration of river water formed under the influence of natural and man-made activities.

Herewith, the volume of the substance absorbed by water semi-submersible vegetation is determined using the third term equation of the hydrochemical balance of the substance of river runoff [1]:

$$C_{pb} = \frac{b_{\max} \cdot S(w) \cdot S(c)}{(A \cdot g_б + g_{bon})} = C_b \cdot S(w) \cdot S(c),$$

here C_{pb} is the indicator of self-cleaning ability of semi-submersible water vegetation, i.e. $C_b = b_{\max} /(A \cdot g_б + g_{bon})$.

If river water concentration is known (C_{pm}), which are formed under the influence of natural and man-made activities, then taking into account the self-purification ability of semi-submersible aquatic vegetation (C_{pb}), substance balance equation, relative to concentration (C_p), has the following form [1]:

$$C_p = C_{pm} - \frac{b_{\max} \cdot S(w) \cdot S(c)}{(A \cdot g_б + g_{bon})} = C_{pm} - C_b \cdot S(w) \cdot S(c) \cdot$$

The analysis of mathematical models characterizing the substance balance equation with relative to concentration (C_p) shows that the derivative of the function describing the change in the stationary state

of the system according to the factors under consideration, that is W_i и C_i, must be increasing: $dC_p / dw > 0$, $dC_p / dc > 0$.

It should be noted, firstly, the function adequately meets the condition when, for the normal development of aquatic semi-submersible vegetation, according to the law of Y. Liebig, a number of circumstances are required at the same time so that it loses biological stability, enough critical situation for one of the considered factors, secondly, one-factor dependences $S(w)$ and $S(c)$ are determined by concentration $C_б$, but not C_p, since the latter is the result of the action of self-purification of the ability of water semi-submersible vegetation (C_{pb}), thirdly, to determine the maximum allowable impact of the natural-man-made system C_p, the derivative of the function is taken only according to the variable parameters of the state of the river (W_i, C_i); fourthly, the maximum allowable concentration of river water is determined at a fixed value of the river flow of water and vice versa fixed level of river pollution.

For determining the maximum allowable impact of the natural and man-made system in the watersheds of the Karatal river basin, the following value of the aquatic ecosystem is used: A = 0,35 - dimensionless indicator characterizing the ratio of the natural flow of the river (the rate of flow or environmental flow) (W_p или $W_э$) to the volume of river flow ($W_б$); b_{max}=0,20 - the specific maximum volume of substances absorbed by aquatic vegetation per unit volume of water, kg / m3;drain module from the catchment (l / s·km^2); $g_б$ = 3,55 drain module from the catchment (l / s·km^2); K_b=0.50 is the return water coefficient; $K_{из}$ = 0,25-groundwater ratio; C_p^{opt}=0,30 - the concentration of a substance in a river that is optimal for water semi-submersible vegetation (g / l); C_p^{max}=1,00 –maximum concentration of a substance in a river for water semi-submersible vegetation (g / l) (table 2 and figure 2).

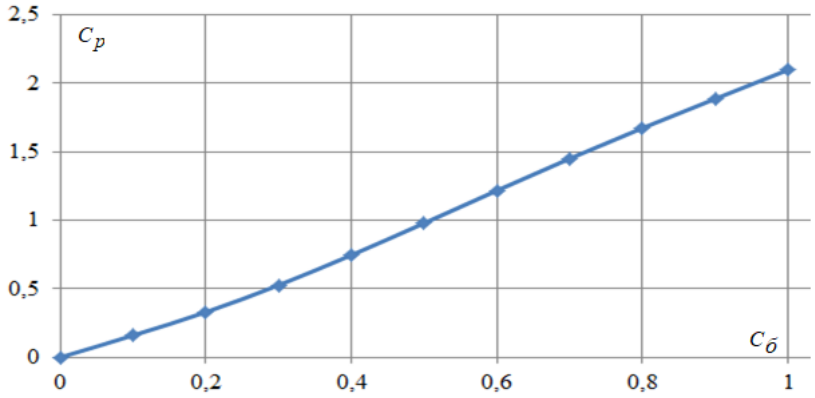

Figure 2 – Dependence of water concentration (C_{pm}) in the catchments of the river basin, which is formed as a result of natural and man-made activities from the specific removal of the substance from a catchment area unit ($C_б$)

Thus, as can be seen from figure 2, which was built on the basis of data from table 2, the change in water concentration (C_{pm}) in the catchments of the Karatal river basin as a result of natural and man-made activities, the concentration of water in the river (C_{pm}) increases with an increase in the specific removal of matter from a unit of the catchment area ($C_б$).

For a system analysis of the behavior of a function $У(C_p) = f(\varphi)$, it is necessary to consider its derivative with respect to the considered environmental factors, that is $У'(C_p) = f'(\varphi)$, then the derivative of these functions can be represented as follows:

$$У'(C_p) = \lim_{\Delta\phi \to \infty} \frac{f(\phi + \Delta\phi) - f(\phi)}{\Delta\phi} \approx \frac{f(\phi + \Delta\phi) - f(\varphi)}{\Delta\phi}.$$

Thus, depending on the concentration of pollutants in the river ($C_б$), the determination of its production from the concentration of pollutants in the river $dC_p / dC_б$, without taking into account the

self-purification ability of semi-submersible aquatic vegetation, is made in a tabular form (table 3) and is presented in figure 3.

Table 2 – Determination of the maximum allowable range of the impact of the factors under consideration in the catchments of the Karatal river basin

Indicators	The range of impact of the considered environmental factors ($C_б$)										
	0,0	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0
A	0.350	0.350	0.350	0.350	0.350	0.350	0,350	0,350	0,350	0,350	0,350
$g_б$	3.550	3.550	3.550	3.550	3.550	3.550	3.550	3.550	3.550	3.550	3.550
$A \cdot g_б$	1,242	1,242	1,242	1,242	1,242	1,242	1,242	1,242	1,242	1,242	1,242
g_{bon}	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
$A \cdot g_б + g_{bon}$	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942
$g_б \cdot C_б$	0,000	0,355	0,710	1,065	1,420	1,775	2,130	2,485	2,840	3,195	3,550
$\frac{g_б \cdot C_б}{(A \cdot g_б + g_{bon})}$	0,000	0,183	0,365	0,548	0,731	0,914	1,097	1,280	1,463	1,646	1,829
$K_b + K_{nз}$	0,750	0,750	0,750	0,750	0,750	0,750	0,750	0,750	0,750	0,750	0,750
$(K_b + K_{nз}) \cdot C_б$	0,000	0,075	0,150	0,225	0,300	0,375	0,450	0,525	0,600	0,675	0,750
$(K_b + K_{nз}) \cdot C_б \cdot g_{bon}$	0.000	0.053	0.105	0.158	0.210	0.263	0.315	0.368	0.420	0.473	0.525
$\frac{g_{bon} \cdot C_б (K_b + K_{nз})}{(A \cdot g_б + g_{bon})}$	0,000	0,027	0,054	0,081	0,108	0,135	0,162	0,189	0,216	0,243	0,270
C_{pm}, g / l	0,000	0,210	0,419	0,629	0,839	1,049	1,259	1,469	1,679	1,889	2,099
$S(c)$	0.000	0.464	0.864	1.000	0.897	0.670	0.399	0.182	0.054	0.005	0.000
$S(c) \cdot b_{\max}$	0.000	0.097	0.173	0.200	0.179	0.134	0.080	0.036	0.011	0.001	0.000
$\frac{b_{\max} \cdot S(c)}{A \cdot g_б + g_{bб}}$	0.000	0.050	0.089	0.102	0.092	0.069	0.041	0.018	0.005	0.001	0.000
C_p, g / l	0.000	0.160	0.333	0.527	0.747	0.980	1.218	1.451	1.674	1.888	2.099

Table 3 – Determination of the driving function $dC_p / dC_б$ from the concentration of pollutants in the river, without taking into account the self-purification ability of semi-submersible aquatic vegetation depending on the concentration of pollutants in the riverKaratal ($C_б$)

$C_б$	C_p	$dC_p / dC_б$
0,0	0.000	1,00
0,1	0.160	1,60
0,2	0.333	1,73
0,3	0.527	2,39
0,4	0.747	2,20
0,5	0.980	2,33
0,6	1.218	2,38
0,7	1.451	2,33
0,8	1.674	2,23
0,9	1.888	2,14
1,0	2.099	2,11

The graph shows the derivative (figure 3), the range of concentration ($C_б$) in the waters of the Karatal river basin, within which the Le Chatelier-Brown principle is fulfilled, that is, the minimum concentration value ($C_б^{\min}$) is 0.30 g / l and the maximum concentration value ($C_б^{\max}$) -0.60 g / l in non-returnable water consumption (1 – A)=0,75.

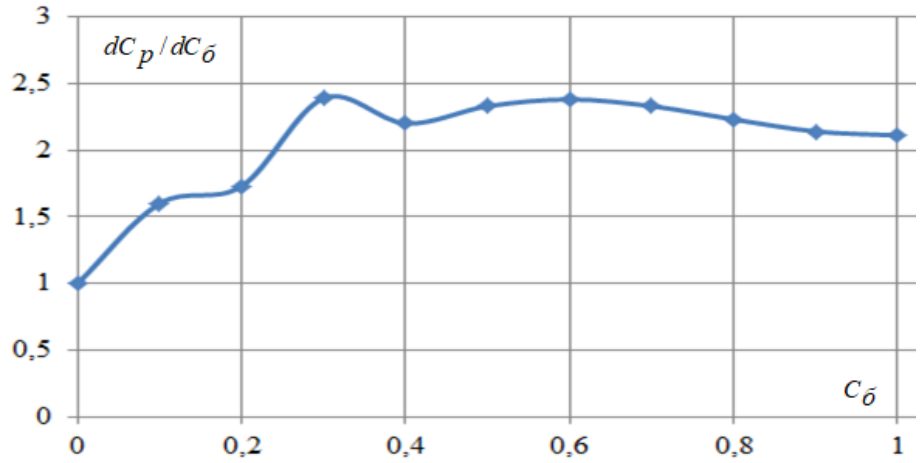

Figure 3 – Graph of dependence of the driving function $dC_p / dC_б$ from the concentration of pollutants in a river, without taking into account the self-purification capacity of semi-submersible aquatic vegetation depending on the concentration of pollutants in the river ($C_б$) Karatal

As, it can be seen from figure 3, the concentration of pollutants from the flow of water of the river Karatal, formed as a result of natural and man-made activity ($C_б$) and its $dC_p / dC_б$ derivative of the concentration of pollutants in the river comparing with the relative productivity curve of water semi-submersible vegetation ($S(\varphi)$) depending on the range of variation of the considered environmental factors (φ_i),it can be seen that the maximum value of the function is observed within the range of 0.40-0.60, which shows the possibility of using them to estimate the maximum allowable value of river flow, ensuring the environmental sustainability of the natural system of river basins.

On the basis of these principal positions, it can be determined the maximudm permissible level of use of the volume or flow of water in river basins, that is, it can be determined the maximum permissible level of anthropogenic load on the ecological system using the following formulas:

$$W_n = W_p \cdot S(w) \cdot S(c),$$

$$Q_n = Q_p \cdot S(w) \cdot S(c),$$

here W_n, Q_n - the maximum permissible level of use of the volume or flow of water flows in river basins, km^3 or m^3 / s; W_p, Q_p - the volume or flow of water formed in river basins, km^3 or m^3 / s.

Therefore, based on the use of the equation, for determining the maximum allowable level of use of the volume or flow of water in river basins, it is possible to determine the volume ($W_Э$) and consumption of environmental flow ($Q_Э$), ensuring the environmental sustainability of the natural system of river basins:

$$W_Э = W_p \cdot [1 - S(w) \cdot S(c)],$$

$$Q_Э = Q_p \cdot [1 - S(w) \cdot S(c)].$$

On the basis of mathematical models, for determining the ecological flow and maximum allowable level of water use of river basins and the average annual water consumption in various facilities of the Karatal river in the period 1932-2009, a forecast was calculated to determine the ecological flow and non-returnable water consumption in the regional economy (table 3).

When building a forecast calculation to determine the ecological flow and non-returnable water consumption in economic sectors in the catchments of the Karatal river basin, the following provisions were taken into account, that is, first, the calculation period was considered within the past (1932-1986) and the present (1987-2009) which show changes in water consumption in rivers on a time scale, and secondly, information and analytical materials were used to assess changes in the flow of water in rivers on a spatial scale.

Table 3 – Forecast calculation on the use of water resources in the catchments of the Karatal river basin

Settlement period	Indicators	Q_o, m^3/s	W, million m^3	C_v	C_S	River water flow at various sufficiency, m^3 / s						
						5%	10%	25%	50%	75%	90%	95%
Hydrological station - the village of Karatal, located at the exit of the foothills of the Zhetisu Alatau												
1932-1986	Q_p, m^3/s	25,0	789	0,23	0,69	35,50	32,70	29,60	24,30	20,90	18,20	16,80
	Q_n, m^3/s					21,30	19,62	17,76	14,58	12,54	10,92	10,08
	$Q_Э$, m^3/s					14,20	13,08	11,84	9,72	8,36	7,28	6,72
1987-2009	Q_p, m^3/s	34,9	1100	0,24	0,72	50,10	46,00	41,50	33,90	28,80	25,00	23,10
	Q_n, m^3/s					30,06	27,60	24,90	20,34	17,28	15,00	13,86
	$Q_Э$, m^3/s					20,04	18,40	16,60	13,56	11,52	10,00	9,24
Hydrological station - the village Naimensuk, located on the flat territory of the basin of Lake Balkhash												
1932-1986	Q_p, m^3/s	71,9	2269	0,33	0,89	115,00	103,00	89,70	68,00	54,30	44,30	39,60
	Q_n, m^3/s					69,00	61,80	53,82	40,80	32,58	26,58	23,76
	$Q_Э$, m^3/s					46,00	41,20	35,88	27,20	21,72	17,72	15,84
1987-2009	Q_p, m^3/s	77,4	2443	0,29	0,78	119,00	107,00	94,90	74,60	61,10	51,10	46,20
	Q_n, m^3/s					71,40	64,20	56,94	44,76	36,66	30,66	27,72
	$Q_Э$, m^3/s					47,60	42,80	37,96	29,84	24,44	20,44	18,48

Hydrological posts - Karatal village, located at the exit of the foothills of the ZhetisuAlatau and Naimensuk, located on the flatland basin of Lake Balkhash, which allow developing a management system and regulation of water resources, ensuring rational and effective use for the development of industries in the regions.

Conclusions. Based on the equation of hydrochemical water balance of river basins and iodine factor dependencies characterizing the relative productivity of semi-submersible water vegetation from river flow and the content of pollutants, a mathematical model has been developed to determine the environmentally acceptable load in watersheds of the river basin, including predicting the concentration of pollutants in the river water, a acceptable level of non-returnable water consumption and ecological runoff, which are realized us to determine the maximum permissible level of natural and technogenic load Karatau Basin, showing the possibilities of their use for the planning, management and regulation of river basin water resources to ensure the sustainability of the natural system of the region.

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ҚАРАТАЛ ӨЗЕНІНІҢ СУЖИНАУ АЛАБЫНЫҢ ШЕКТЕЛГЕН-МҮМКІНШІЛІК ЖҮКТЕМЕСІН МӨЛШЕРЛЕУ

Аннотация. Өзен алабының гидрохимиялық теңгермесінің теңдеуінің және өзеннің ағынының және ондағы ластаушы заттардың құрамына байланысты суға жартылай батқан су өсімдігінің өнімділігінің қатынасын сипаттайтын бір дәлелдемелі теңдеудің негізінде, өзеннің сужинау алабының экологиялық тұрғыдан шектелген-мүмкіншілік жүктемесін анықтауға арналған математикалық үлгі құрылған, ал ол өзеннің ағынының тұтынудан қайтарылмайтыншектелген-мүмкіншілік деңгейін және экологиялық ағынын жобалауға пайдалануға болады және ол Қаратал өзенінің алабының шектелген-мүмкіншілік жүктемесін дәрежесін анықтау үшін қолданылған.

Түйін сөздер: өзеннің сужинау алабы,экология, су, заттар, ластану, мөлшер, өнімділік, гидрохимиялық теңгерменінің теңдеуі, жүктеме, үлгі.

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НОРМИРОВАНИЕ ПРЕДЕЛЬНО-ДОПУСТИМОЙ НАГРУЗКИ В ВОДОСБОРАХ БАССЕЙНА РЕКИ КАРАТАЛ

Аннотация. На основе уравнения гидрохимического баланса вод речных бассейнов иоднофакторной зависимости, характеризующей относительную продуктивность водной полупогружной растительности от речного стока и содержания загрязающих веществ, разработана математическая модель для определения экологически предельно-допустимой нагрузки в водосборах бассейна реки, включающих прогнозирование концентрации загрязняющих веществ воды в реке, предельно-допустимого уровня безвозвратного водопотребления и экологического стока, которые реализованы, для определения предельно-допустимого уровня природно-техногенной нагрузки в бассейне реки Каратал.

Ключевые слова: водосбор речного бассейна, экология, вода, вещество, загрязнение, норма, продуктивность, уравнение гидрохимического баланса, нагрузка, модель.

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VARIABILITY OF SELECTIONED SIGNS OF DEGERESS SHEEPS DEPENDING ON THE QUALITY OF THE WOOL

Abstract. To obtain higher rates of meat and wool productivity of degeress semi-fine-grained sheep with different tint of wool of the modern population, in the conditions of the "Madi" breeding farm it is necessary to conduct a homogeneous selection of (48×48) animals with 48 quality of the wool.This selection, in comparison with other variants of homogeneous selection (50x50; 56x56; 58x58) gives more aligned highly productive offspring.

Keywords: sheepskin sheep breeding, degeress sheep, wool quality.

Introduction. Animal husbandry is the second group of branches of agriculture, the importance of which can not be overestimated. Animal husbandry does not develop in isolation from agriculture, but with it. In Russia and near abroad there are no purely cattle-breeding or purely agricultural areas, both branches are well represented everywhere, between which there are close bilateral ties [1].

Fat-tailed sheep breeding is one of the leading sectors of the domestic livestock of our country, whose share currently stands at more than 70% of the total sheep population. Breeding fat-tailed sheep has long been predefined climatic and economic conditions and national traditions of the indigenous population. They are characterized by exceptionally high meat content - as if by nature created to provide humankind with essential products, such as meat and fat. An important feature of these sheep is quite high hereditary - due to the precocity and exceptional stamina added to that the high meat productivity of sheep are able to exercise when poor conditions of feeding and maintenance. In addition, the main argument in favor of fat-tailed breeds of sheep is adapted to harsh local conditions.

Indicators of live weight of the individual best individuals of different age and sex groups of animals indicate a large genetic potential of the created herd of sheep, which is of great importance for future breeding [2].

Rational use of specific combinations of genetic potential of sheep breeds and the creation on this basis of promising populations with high meat productivity and consolidated by heredity, combined with valuable adaptive properties is one of the key conditions to improve the efficiency of meat-greasy wool (semi-rough) and meat-wool-greasy (semi-thin) fat-tailed sheep. With the same level of meat production more profitable and economically efficient farming is degeress meat and wool (semi-thin andsemi-rough) breed of sheep. To extend the area of cultivation, in 1995 degheress sheep was first brought to the new foothills breeding farms «MADI» Zhambyl district of Almaty region. Favorable climatic and forage conditions of this territory had a beneficial effect on the formation of economically useful traits degeress sheep. Currently, the livestock of this farm has the best gene pool on both interbreed types Degeress meat-wool sheep breed with semi-thin and semi-rough wool. Cognition of the laws of ontogenesis of farm animals is an important task of zootechnical science, as in the process of individual development, a particular individual acquires not only species and breed characteristics, but also its inherent individuality with all the features of the Constitution, exterior, temperament, viability and productivity.

Dry-steppe, semi-desert, desert, foothill-desert-steppe, foothill-desert, mountain-steppe zones are distinguished on the territory of the republic. The production of crops and agricultural products is located in view of zonal features [3].

Research work on two breeds of sheep was carried out in 8 breeding subjects of two regions of Kazakhstan (Almaty and Karaganda). With degheress fat-tailed sheep breed 8 breeding farms: "Kungey", "Antiki" Balkhash area, "MADI" Zhambyl district, "Akboz" of Panfilovsky district of Almaty, "Babati", "Sarsenbek", "Shormanov", "Gemsy" Aktogay district, Karaganda regions. The number of females of all breeding farms at degeress and Saryarka breeds of sheep is in excess of 25.0 and 27.5 thousand heads respectively. Breeding part of the breeding stock on both breeds is about 20 thousand heads.

The production of lamb and wool fat-tailed sheep should be maximum use of natural pasture forage that will greatly enhance the efficiency of breeding in the conditions of market economy.

The research work was carried out in the farm "MADI" Zhambyl district of Almaty region of Kazakhstan.

Materials and methods of research. The object of the study was degheress sheep meat and wool sheep breed with semi-thin wool.

To study the variability of breeding characteristics degeress semi-fine breeds of sheep, depending on the quality of the wool was held scientific - production experience in the context of breeding farms “MADI” Zhambyl district of Almaty region of Kazakhstan.

The determination of breeding and genetic parameters, as well as the processing of digital materials of experimental studies were carried out using the method of variation statistics according to N. A. Plokhinsky and E. K. Merkurieva using the computer program “Biomet”[4].

For the experiment was formed flock of ewes (3.5 years) 515 sheeps, consisting of 4 groups with different quality of wool: I group (103 sheeps) is the 48th in the quality of wool, II (137 sheeps) -50, the quality of the wool; III (150 sheeps) - 56th quality wool and IV (125 sheeps) - 58 - quality wool. For each experimental group of women appointed one sheep-manufacturer of quality wool. The experience was carried out according to the following scheme (table 1):

Table 1 – Scheme of selection and formation of groups of young animals

The parent pair with the matching coat quality Father Mother	Type of selection	Formed by a group of young offspring
48 x 48	homogeneous	I
50 x 50	homogeneous	II
56 x 56	homogeneous	III
58 x 58	homogeneous	IV

Because of uniform selection on quality of wool 4 groups of the received posterity which were in identical, traditionally accepted in economy, pasture conditions of feeding and the contents were formed.

Results and discussions. Lambs of all groups were born quite large, but at the same time, there were certain differences between them. Studies have shown (table 13) that the highest live weight at birth had lambs of group I, both y ovaries and y testes (4.7 and 4.5 kg, respectively). at the same time, the sheep surpassed peers II; III and IV groups by 0.1; 0.4 kg or 2.1; 8.5 and 8.5%, a brightness respectively by 0.1; 0.3 and 0.2 kg or 2.2; 6.6 and 4.4%. It shows the previously installed patterns of the Degheress sheep: the increase in weight of the animal as the coarsening of their hair. This trend is also evident in other groups, according to age, namely 4.5 -and 7 - month age. Thus, the bars and holes of the I –th group in 4.5 months had a live weight of 36.5 and 33.8 kg, in 7 months - 40.7 and 37.0 kg, respectively, which is 2.0; 3.6; 44.5 and 0.8; 1.5; 3.4%, a in 7 months of age at 3.8; 4.3; 7.4 and 0.8; 2.2; 2.8% higher than the same In all age groups, there is a natural decrease in the variability index (*Cv*), indicating good adaptive qualities of degeresssheep to these conditions of keeping and feeding.

It should be noted that enough high rate of growth and development degeress lambs in the suckling period. Up to 4.5 months of age bagels reached a liveweight in the range of 34.9 - 36.5 kg, the rate of growth y rams - 712 - 676 %, a y bright - 651 – 660 %.

Thus, the most intensive growth and development of lambs resulting homogeneous selection of parents on the quality of wool is installed in the first group, regardless of age.

The study of wool productivity y of young animals of all experimental groups (table 2) showed that they have quite high rates of hair cutting and exceed the level of minimum requirements for elite animals of one-year-old age. Thus, it amounted to I group -25,9 %; II -16,6 %; III -14,9% and IV -9,1 %, for the YARS -36,1; 28,5; 16,6% and 14,3%, respectively.

Table 2 – Variability of live weight of young animals, kg

Groups	Indicators	At birth	4,5 month	7 month
male				
I	n	50	47	45
	$\overline{X} \pm m_x$	4,7±0,11	36,5±0,57	40,7±0,40
	Cv	16,4	10,6	6,6
II	n	71	67	64
	$\overline{X} \pm m_x$	4,6±0,09	35,8±0,53	39,2±0,44
	Cv	17,4	12,1	8,9
III	n	65	62	59
	$\overline{X} \pm m_x$	4,3±0,08	35,2±0,42	39,0±0,24
	Cv	15,3	9,5	4,7
IV	n	59	56	52
	$\overline{X} \pm m_x$	4,3±0,10	34,9±0,52	37,9±0,29
	Cv	18,6	11,0	5,5
female				
I	n	48	45	42
	$\overline{X} \pm m_x$	4,5±0,10	33,8±0,49	37,0±0,21
	Cv	15,3	9,6	3,77
II	n	63	61	59
	$\overline{X} \pm m_x$	4,4±0,09	33,5±0,44	36,7±0,19
	Cv	15,9	10,3	4,0
III	n	79	73	68
	$\overline{X} \pm m_x$	4,2±0,06	33,3±0,34	36,2±0,16
	Cv	13,1	8,8	3,6
IV	n	63	57	56
	$\overline{X} \pm m_x$	4,3±0,08	32,7±0,42	36,0±0,18
	Cv	15,8	9,7	3,8

Table 3 – Cut hair of young animals aged 1 year, kg

Groups	Male				Female			
	n	$\overline{X} \pm m_x$	Cv	σ	n	$\overline{X} \pm m_x$	Cv	σ
I	44	5,4±0,15	18,0	0,97	42	4,7±0,12	17,0	0,80
II	62	4,8±0,08	13,7	0,65	58	4,2±0,10	18,1	0,76
III	58	4,7±0,09	15,9	0,74	68	3,6±0,04	10,8	0,39
IV	50	4,4±0,07	12,0	0,53	54	3,5±0,08	16,0	0,58

At the same time, the highest hair cut in the original turned out to be y of the bars and holes of the I group, which surpassed their peers II; III; IV groups, by 0.6; 0.7; 1.0 kg or – 11.1 V; 12,9; 18.5% of 0,5; 1,1; 1,2 kg or -10,6; 23,4; 25.5 %, respectively. The smallest haircut had the bars and holes of the IV group obtained from parent pairs with 58 - quality wool.

The study of the degree of variability of the trait is of particular importance in selection, since the presence of different genotypes in the population is an indispensable condition for further improvement of animals. Quite a wide range of phenotypic variability (*Cv*) of wool (12, 0 – 18, 0% y of sheep and 16,0–17,0% y of eggs) of the studied groups of young animals indicates the effectiveness of mass selection to improve the level of wool productivity of sheep.

Meat productivity is one of the main features that determine the quality of sheep. It known that meat-tallow and wool fat sheep have a combined direction of productivity. Therefore, a lot of attention paid to the study of meat and fat productivity.

We studied the meat-fat productivity of rams semi-fine sheep, depending on the quality of the wool at the age of 4.5 and 18 months (tables 4 and 5).

Table 4 – Results of control slaughter of sheep 4-4.5 months of age (7 heads in each group)

Indicators	Groups			
	I	II	III	IV
Pre-slaughter live weight, kg	37,5	36,0	36,5	35,0
Carcass weight, kg	17,04	16,17	16,30	15,10
Yield ink, %	45,44	44,91	44,65	43,14
The mass of the fat tail, kg	1,5	1,25	0,97	1,05
The output of the tail, %	4,0	3,47	2,65	3,0
Internal fat weight, kg	0,500	0,470	0,400	0,350
Internal fat yield, %	1,33	1,30	1,1	1,0
Slaughter weight, kg	18,86	18,07	17,95	16,55
Killer exit, %	50,3	50,2	49,17	47,28
The mass of the pulp, kg	13,74	12,67	12,60	11,40
The output of pulp, %	80,6	78,3	77,3	75,5
Bone mass, kg	3,3	3,5	3,6	3,7
Bone yield, %	19,3	21,6	22,0	24,5
Meat rate	4,16	3,62	3,55	3,08

Table 5 – Results of control slaughter of sheep in 18 months of age (7 heads in each group)

Indicators	Groups			
	I	II	III	IV
Pre-slaughter live weight, kg	67,3	64,5	62,0	60,3
Carcass weight, kg	29,0	27,0	25,8	24,5
Yield ink, %	43,01	42,86	41,61	40,63
The mass of the fat tail, kg	3,78	3,51	2,66	2,43
The output of the tail, %	5,61	5,44	4,29	4,03
Mass of internal fat, kg	2,65	2,47	2,16	1,93
The output of the internal fat, %	3,94	3,83	3,42	3,20
Slaughter weight, kg	34,8	32,5	30,8	29,4
Killer exit, %	51,71	50,38	49,67	48,75
The mass of the pulp, kg	23,1	21,2	20,0	18,6
The output of pulp, %	79,65	78,51	77,51	75,91
Bone mass, kg	5,9	5,8	5,7	5,7
Bone yield, %	20,34	21,48	22,10	23,26
Meat rate	3,91	3,65	3,51	3,26

The results of the control slaughter show that in all the examined groups of calves received are quite standard weight carcasses. The best slaughter qualities characterized the calves of the first group. Thus, the bars of the first group by mass of carcasses have superiority over peers II, III, IV groups by 5,4; 4,5; 12,8% of carcass yield and slaughter yield - 1,2; 1,8; 5,3% and 0,2; 2,3; 6,4%, respectively. O the superiority of meat-fat qualities of animals of group I indicate and record the output of tail - 4,0%, down from 3.47; 2.65 and 3.0% and the internal fat of 1.33% compared to 1.3; 1.1 and 1.0 %, and the yield of pulp is 80.6%, compared to 78.3 ; 77,3 and 75.5 %, respectively.

In addition, there is some superiority in meat-Sal qualities of animals of the II group. Despite the fact that the mass of carcasses they are not the best (16.17 kg, compared with 16.3 kg), the rest of slaughter they exceed their peers III, IV groups.

The results of the control slaughter of sheep 18 months of age showed that the observed trend in the control slaughter of sheep at the age of 4.5 months is maintained, the highest indicator of meat and fat productivity, again, is typical for the sheep of the First group. For example, the mass of carcasses I group (29, 0 kg), exceeded the rest II, III, IV groups by 7, 4; 12, 4; 18, 4%, respectively. Relatively good indicators marked animals of II group, their superiority over III, IV groups for carcass yield was 4.6; 10.2 percent, respectively. Indicators slaughter weight and slaughter yield established superiority of 7.0; and 12.9 and 18.4 % and 2.6; and 4.1% and 6.1%, respectively. According to the output of fat, the internal fat and the output of the pulp, although slight, the superiority of y animals of group II, compared with III, IV.

Therefore, it should be noted that in the foothill zone Southeast of Kazakhstan has rather favorable conditions for the breeding degheress mutton-wool fat-tailed sheep.

Discussion. The creation and improvement of a highly productive herd of gegeres fat-tailed sheep of various intrabreed zonal types, successfully combining meat - greasy and wool productivity, with high adaptive abilities allows extensive use of the gene pool of this breed to improve the breeding and breeding qualities of other breeds in different regions of Kazakhstan, both by introductory and and industrial and alternating crossbreeding.

Results. The rams of the degeres fat-tailed breed are used as a valuable breeding material for the qualitative transformation of the coat of a large array of local coarse-haired fat-tailed sheep in various regions of the country. In addition, rams with semi-subtle wool are successfully used for both industrial and alternating crossing with the uterus of a number of fine-wool breeds in order to maximize the effect of heterosis in meat productivity in hybrids.

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ДЕГЕРЕС ҚОЙЫНЫҢ ЖҮН САПАСЫНА БАЙЛАНЫСТЫ СЕЛЕКЦИЯЛЫҚ БЕЛГІЛЕРІНІҢ ӨЗГЕРГІШТІГІ

Аннотация. Мақалада құйрықты биязылау жүнді дегерес қой тұқымының жүн сапасына байланысты бір текті жұп таңдау арқылы алынған ұрпақтарының негізгі шаруашылыққа пайдалы селекциялық белгілерінің өзгергіштігі мен кейбір биологиялық ерекшеліктерін зерттеунәтижелері келтірілген. Дегерес қойының өсіру аймағына жақсы бейімделген және неғұрлым ұнамды типтегі мал тобы анықталды.

Түйін сөздер: құйрықты қой шаруашылығы, дегерес қойы, жүн сапасы

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ИЗМЕНЧИВОСТЬ СЕЛЕКЦИОНИРУЕМЫХ ПРИЗНАКОВ ДЕГЕРЕССКИХ ОВЕЦ В ЗАВИСИМОСТИ ОТ КАЧЕСТВА ШЕРСТИ

Аннотация. В статье приведены результаты основных хозяйственно-полезных признаков и биологических особенностей потомства полученных однородного подбора родительских пар, в зависимости от качества шерсти дегересской курдючной полутонкорунных породы овец. Установлено наиболее желательный тип качества шерсти дегересских овец, хорошо приспособленных в условиях зоны их разведения.

Ключевые слова: курдючное овцеводство, дегересские овцы, качество шерсти.

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COMPARATIVE EVALUATION OF DROUGHTABILITY OF VARIETIES OF LENTILES

Abstract. Article results in laboratory experiments to determine the relative drought variety samples method lentil seed germination in the sand in a solution of PEG -10%, 15%. Data on drought tolerance are given. Analysis of lentil samples under conditions of osmotic stress (PEG 10% and PEG 15%) revealed highly dry-resistant samples: K-6, 39113 (Russia).

Keywords: lentils, variety samples, germination, drought resistance, osmotic stress.

Introduction. Lentils are among the most valuable food leguminous crops grown mainly for grain, which is more than a third of protein. Lentil protein contains essential amino acids for the body. Lentil dishes serve for us as suppliers of essential vitamins and minerals that are completely absorbed by the human body. On the content of iron, for example, it has no equal. Lentil has another very valuable property; it does not accumulate in itself any harmful or toxic elements (nitrates, radionuclide's, etc.). Due to this, lentils grown anywhere in the world can be considered an environmentally friendly product [1].

In Kazakhstan, lentils are sown on the territory of the order of 331,566.5 thousand hectares, mostly these plots are located in the north of the republic and are grown in non-irrigated conditions.

In recent years the numbers of dry years are increasing due to the sharp warming on the planet. Drought is a rather frequent phenomenon that disrupts the normal course of physiological and biochemical processes in plants and leads to a decrease in their productivity [6].

Based on the physiological characteristics of plants, the selection of a number of leguminous crops, among other areas, justifies the feasibility of creating genotypes with high intensity of growth processes in the early stages of development to isolate drought-resistant genotypes [3]. Studies conducted on peas have shown that within the optimal length of the stem for a specific soil-climatic zone, genotypes that differ in faster germinal root growth rates have advantages in crop formation [4]. This provides favorable starting conditions for the development of plants, *contributing to the* good rooting of seedlings, an increase in the absorbing surface of the root system, as well as drought tolerance [5]. Currently, there are many physiological methods for assessing the drought tolerance of field crops. The simplest, indirect methods for mass estimation of relative drought tolerance are based on the determination of seed germination and the growth of seedlings in osmotic solutions imitating moisture. The ability of seeds to germinate under these conditions reflects, on the one hand, the hereditary characteristic of germination with relatively less water, on the other, the presence of a high suction force, which ensures the rapid absorption of the requiredamount of water [8]. The high sucking power of the seeds causes not only better germination with a lack of moisture, but also the formation of a more powerful root system (primitive), which is important for the further life of the plants, especially during drought, i.e. properties of the seedling to a large extent affect the formation of drought tolerance in an adult plant [2]. In this regard, it is necessary to select the adaptive and most drought-resistant variety samples.

Methods. The objects of research were 31 collection samples of lentils from different countries. The laboratory studies on the assessment of the drought resistance of lentil plants were carried out in the laboratory "Analysis of grain quality" LLP "Kazakh Research Institute of Agriculture and Crop Production". Drought tolerance relative lentil accessions were evaluated in the early stages of plant growth by seed germination in the sand in 3 cases (PEG-10%, PEG-15%,control isdistilled water) to 3-fold replicates. The seeds were germinated in a thermostat, at a temperature of $+20^{0}$ C in the dark. Seed germination was taken into account on day 7. It was dried in a drying cabinet at a temperature of $+130^{0}$ C, 40 minutes. According to the methodological guide All-Russian Institute of Plant Industry 1988 Udovenko G.V. [2], solutions with different concentrations of PEG 6000 were prepared according to the method of Michel B. E., KaufmannM. R. [7].

The percentage of germinated seeds (P) is determined as follows:

The number of seeds germinated in the control is taken as 100%, the average number of seeds germinated in an osmotic stress medium (PEG 15% and PEG 10%) (a)is expressed as a percentage of the number of seeds germinated in the control (b) thus formula 1:

$$P = \frac{a}{b} * 100\% \, . \qquad (1)$$

The higher the percentage of seed germination in the PEG nutrient medium is 15%, the more drought-resistant the sample.

To determine depression of growth processes (Index of tolerance), the average dry weight of the seedlings in the control is taken as 100% (x), the average dry weight in the osmotic stress medium (PEG 10% and PEG 15%) (y) is determined in percent of dry weight by seedlings with increased osmotic pressure (z) is determined by the formula 2:

$$Z = 100 - y/x * 100 \, . \qquad (2)$$

In more drought tolerance, the accumulation of seedlings of biomass is inhibited to a lesser extent.

Results. In determining the germination of various levels of osmotic stress of lentils, no significant differences were found. To characterize the drought tolerance of plants, these lengths and numbers of germinal roots were used, since the ability to form a powerful primary root system plays an important role in drought conditions.

The lack of water caused by various concentrations of PEG led to a decrease in stem height, root length and seedling mass, for different lentil samples (figure).

a b c

Seedlings on day 7: a – control, b – PEG-10%, c – PEG -15%

In control, stem height and root length was longer than sprouts in an osmotic stress environment.

Table 1 – Characteristics of drought resistance at stem height and germ-length roots

Sample name	Stemheight, cm			Germ length, cm		
	Control	PEG 10%	PEG 15%	Control	PEG 10%	PEG 15%
4605	10	4.1	3.5	4.2	3.4	2.8
K-184	10	6.2	4.	4.5	3.6	2.5
LC046000246L	10	4.3	3.2	4.5	3.7	2.3
39113	9.9	4.9	3.1	3.9	3.3	2.4
LC04600023L	9.6	4.3	3.5	4.1	2.8	2.8
K-2849	9.5	4.6	3.4	4.8	3.7	2.9
LC04600017L	9.4	4.4	4.1	3.8	3.8	3.2
LC04600068L	9.2	3.9	3.2	3.3	3	2.9
23108	9.2	4.9	3.8	4.3	3.2	2.9
Vekhovskaya	9.1	3.9	2.7	5.1	3.7	3.2
LC046000213L	9.1	4.3	3.5	3.7	3.3	3
23208	8.9	4.8	3.3	4.3	3.3	1.9
39126	8,8	4.1	3.3	3.9	3.5	3.3
K-1975	8.7	4.7	3.7	3.5	2.8	2.5
LC046000103L	8.7	4.5	2.8	4.9	3.6	3.3
23209	8.7	3.9	3.2	3.3	3.3	3.2
LC046000270L	8.6	5.5	4.1	4.4	4.2	3.4
K-2017	8.5	5.2	3.6	3.7	3.1	1.9
39119	8.5	3.6	3.5	3.9	3.4	3.1
23202	8.4	4.2	3.3	3.8	3.5	2.3
LC046000150L	8.4	3.8	3.3	3.3	3.5	3
31215	8.2	4.4	4.	3.5	3.2	2.9
LC046000156L	8.2	4.1	2.4	3.5	3.1	2.7
39203	8.1	4.6	4.2	3.5	2.9	2.9
LC046000223L	8.1	4.1	4.1	3.4	3.5	3.4
LC04600010L	7.9	4.5	3.7	3.5	3.3	3
K-6	7.9	7.5	4.1	5.9	2.9	2.5
LC046000170L	7,8	3.8	3.3	3.1	3.1	2.7
LC046000202L	7.7	4.1	3.1	3.97	2.4	2.4
39227	7	3	2.6	2.7	2.6	2.4
39229	7.1	4.3	3.3	3.4	2.8	2.2

The height of the stem under the conditions of osmotic PEG-10% allocated breeding numbers (7.5-5.2 cm): K-184, LC046000270L, K-2017, K-6, with PEG-15% stood out (4.2-4 cm): K-184, LC04600017L, LC046000270L, 31215, 39203, LC046000223L, K-6.

The length of the root in the osmotic medium PEG-10% stood out (4.2-3.5 cm): LC046000270L, when PEG-15% stood out (3.4-3.1 cm): 39126, LC046000103L, LC046000270L, LC046000223L sorrow samples.

Table 2 –Evaluation of drought tolerance by green and dry weight of lentil seedlings

Sample name	Green mass, g			Dry weight, g		
	Control	PEG 10%	PEG 15%	Control	PEG 10%	PEG 15%
4605	5.8	2	1.9	1.2	0.8	0.5
K-184	1.5	1.4	1.2	0.3	0.4	0.4
LC046000246L	2.5	2	1.5	0.7	0.7	0.5
39113	2.3	1.6	1.6	1.	0.5	0.4
LC04600023L	1.8	1.6	1.6	0.7	0.6	0.4
K-2849	2.6	2.1	1.6	0.8	0.6	0.6
LC04600017L	1.7	1.5	1,3	0.6	0.5	0.3
LC04600068L	2.3	1.6	1.4	0.7	0.6	0.6
23108	1.2	1.	0.9	0.3	0.5	0.4
Vekhovskaya	4.8	1.79	1.2	1.2	0.7	0.5
LC046000213L	2.7	2.1	1,3	0.9	0.7	0.5
23208	1.87	1.5	1.8	0.5	0.5	0.6
39126	1.7	1.6	1.1	0.6	0.5	0.4
K-1975	1,3	1.29	1.2	0.6	0.2	0.4
LC046000103L	1.97	1.6	1.6	0.8	0.7	0.4
23209	2.1	1.9	1.9	0.9	0.9	0.5
LC046000270L	2.1	1.5	1.6	0.9	0.6	0.5
K-2017	2.8	2.2	1.7	0.6	0.4	0.3
39119	1.8	1.7	1.5	0.8	0.5	0.5
23202	2.4	1,3	1.9	0.7	0.6	0.6
LC046000150L	1.7	1.5	1.4	0.6	0.6	0.5
31215	1.6	1.5	1.2	0.6	0.5	0.3
LC046000156L	3.7	2.3	1.7	0.7	0.6	0.45
39203	1.4	0.9	0.9	0.5	0.4	0.2
LC046000223L	1.7	1.7	1.6	0.6	0.6	0.5
LC04600010L	1.7	1.5	1.5	0.8	0.6	0.5
K-6	5.9	5.3	2.1	1.1	0.3	0.3
LC046000170L	4.	2.54	2.1	0.9	0.6	0.9
LC046000202L	1.8	1.7	1.56	0.9	0.6	0.4
39227	7,6	3.9	1.4	0.5	0.6	0.6
39229	4.01	2.8	1.4	0.4	0.4	0.3

According to the green mass in the osmotic medium PEG 10% stood out (0.9-5.3 g): K-6, LC046000170L, 39227, with PEG-15% (0.9-2.1 g): K-6, LC046000170L variety samples.

By dry mass, promising in an osmotic medium is 10% PEG-e (0.4-1.2 g): K-6, LC046000170L, with PEG-15% (0.3-0.9 g): K-6, LC046000170L variety samples.

In more drought-resistant varieties, the accumulation of seedlings of biomass is inhibited to a lesser extent.

Table 3 – Analysis of the resistance index of lentil samples with osmotic stress PEG-10%

Name of variety samples	Origin	Sustainability Index %
		PEG 10%
Resistant variety samples		
K-6	Russia	72.7
K-1975	Canada	66.7
39113	Russia	50
Medium StableSamples		
Vekhovskaya	Russia	41.7
39119	Russia	37.5
4605	Russia	33.3
K-2017	Canada	33.3
LC046000202L	Syria	33.3
LC046000270L	Syria	33.3
K-2849	Russia	25
LC04600010L	Syria	25
LC046000213L	Syria	22.2
39203	Russia	20
39126	Russia	16.7
LC04600017L	Syria	16.7
31215	Russia	16.7
LC04600023L	Syria	14.3
23202	Russia	14.3
LC04600068L	Syria	14.3
LC046000156L	Syria	14.3
LC046000103L	Syria	12.5
Sensitive variety samples		
23208	Russia	0
LC046000246L	Syria	0
LC046000223L	Syria	0
LC046000150L	Syria	0
23209	Russia	0
39229	Russia	0
39227	Russia	-20
K-184	Russia	-33,3
23108	Russia	-66,7

The results showed that osmotic stress has a significant impact on early vegetative developmental stages; the effect depended on the degree of stress. By definition, depression of growth processes with an osmotic stress concentration of PEG of 10%, according to the tolerance index, was divided into 3 groups:

Resistant variety samples are K-6, K-1975, 39113. Mediumly resistant variety samples are Vekhovskaya, 39119, LC046000170L, 4605, K-2017, LC046000202L, LC046000270L, K-2849, LC04600010L, LC046000213L, 39203, by the index, by the text, by the text, by the text; 23202, LC04600068L, LC046000156L, LC046000103L. Sensitive is 23208, LC046000246L, LC046000223L, LC046000150L, 23209, 39229, 39227, K-184, 23108 are variety samples.

Table 4 – Analysis of the stability index of lentil samples with osmotic stress PEG-15%

Name of variety samples	Origin	Sustainability Index %
		PEG 15%
Resistant variety samples		
K-6	Russia	72.7
39113	Russia	60
39203	Russia	60
4605	Russia	58.3
Vekhovskaya	Russia	58
LC046000202L	Syria	55.5
K-2017	Canada	50
LC046000103L	Syria	50
LC04600017L	Syria	50
31215	Russia	50
Medium StableSamples		
LC046000213L	Syria	44.4
LC046000270L	Syria	44.4
23209	Russia	44.4
LC04600023L	Syria	42,8
LC04600010L	Syria	37.5
39119	Russia	37.5
LC046000156L	Syria	35.7
K-1975	Canada	33.3
39126	Russia	33.3
LC046000246L	Syria	28.6
K-2849	Russia	25
23202	Russia	14.3
LC04600068L	Syria	14.3
39229	Russia	25
LC046000150L	Syria	16, 7
LC046000223L	Syria	16.7
23202	Russia	14.3
LC04600068L	Syria	14.3
Sensitive variety samples		
LC046000170L	Syria	0
23208	Russia	-20
39227	Russia	-20
K-184	Russia	-33,3
23108	Russia	-33,3

According to the definition of depression, growth processes with an osmotic stress concentration of PEG of 15% were divided into 3 groups:

Sustainable variety samples are K-6, 39113, 39203, 4605, Vekhovskaya, LC046000202L, K-2017, LC046000103L, LC04600017L, 31215. Mediumly resistant variety samples areLC046000213L, LC046000270L, 23209, LC04600023L, LC04600010L, 39119, LC046000156L, K-1975, 39126,

LC046000246L, K-2849, 39229, LC046000150L, LC046000223L, 23202, LC04600068L. Sensitive is LC046000170L, 23208, 39227, K-184, 23108 are variety samples.

Conclusion. The results showed that osmotic stress has a significant impact on early vegetative developmental stages; the effect depended on the degree of stress.

Analysis of lentil variety samples under osmotic stress conditions (PEG 10% and PEG 15%) revealed highly drought-resistant variety samples: K-6, 39113.

These samples will be used as a starting material for breeding work on drought tolerance.

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ЖАСЫМЫҚ СОРТҮЛГІЛЕРІН ҚҰРҒАҚШЫЛЫҚҚА ТӨЗІМДІЛІГІН САЛЫСТЫРМАЛЫ БАҒАЛАУ

Аннотация. Мақалада жасымық сортүлгілерін құрғақшылыққа төзімділігін құмда ПЭГ-10%, 15% ерітінділерімен зертханалық тәжірибе арқылы анықтау. Құрғақшылыққа қатысты деректер келтірілген. Осмотикалық стресс (ПЭГ 10% және ПЭГ 15%) талдауы бойынша жасымық сортүлгілерінен құрғақшылыққа өте төзімді үлгілері анықталды: К-6, 39113 (Ресей).

Түйін сөздер: жасымық, сортүлгілері, өнгіштік,құрғақшылыққа төзімділік, осмотикалық стресс.

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СРАВНИТЕЛЬНАЯ ОЦЕНКА ЗАСУХОУСТОЙЧИВОСТИ СОРТООБРАЗЦОВ ЧЕЧЕВИЦЫ

Аннотация. В статье приведены результаты лабораторных опытов по определению относительной засухоустойчивости сортообразцов чечевицы методом проращивания семян на песке в растворе ПЭГ - 10%, 15%. Приводятся данные по засухоустойчивости. Анализ сортообразцов чечевицы в условиях осмотического стресса (ПЭГ 10% и ПЭГ 15%) выявил высокозасухоустойчивые сортообразцы: К-6, 39113 (Россия).

Ключевые слова: чечевица, сортообразцы, всхожесть, засухоустойчивость, осмотический стресс.

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COMPARATIVE INDICATORS OF EFFICIENCY OF THE SPECIALIZED MEAT CATTLE KAZAKH WHITE-HEADED, GEREFORDSKY AND ABERDEEN-ANGUSSKIY OF BREEDS IN KAZAKHSTAN

Abstract. The meat cattle breeding is the priority branch of livestock production which gained in recent years intensive development in the Republic of Kazakhstan. The purpose of researches was studying of productive and breeding qualities of young growth of meat cattle of domestic and import breeds. The practical importance of results of researches consists in increase in production of high-quality meat products. In article materials of comparative studying of growth and development of young growth domestic Kazakh white-headed and also posterities of the breeding animals of the Angus and gerefordsky breeds delivered to Kazakhstan on import are stated. It is established that the young growth of the meat cattle imported to the republic in general keeps the genetically caused useful qualities, however differs on some indicators from analogs of the main domestic breed Kazakh white-headed that is caused by the continuing process of adaptation of the delivered genotypes to new conditions of the habitat.

Keywords: meat breeds, Angus, gerefordsky, Kazakh white-headed, efficiency, adaptation, tests.

Introduction. Need of development of specialized meat cattle breeding in Kazakhstan is caused by existence of big massifs of natural pastures in areas, remote from large settlements, where there are inexhaustible opportunities of receiving high-quality, organic beef by low-cost production. In the course of reforming of the agrarian sector the number of a livestock of the meat cattle including breeding, there was a reorganization of breeding farms and their crushing on smaller to various forms of ownership was considerably reduced. Nevertheless, the gene pool of the domestic and imported breeds allowing to provide their preservation further improvement and development [1.2] is available now.

The meat cattle breeding of Kazakhstan, now, is presented domestic (Kazakh white-headed and auliyekolsky) and also imported to the republic from foreign countries (gerefordsky and aberdin-Angus) by breeds. In this regard the special relevance is acquired by the scientific research directed to studying of adaptation qualities of import animals and their posterity that first of all is defined by reproductive ability, indicators of growth and development of young growth in the new habitat [3].

Technique of researches of the Research were carried out on animals of breeding herds Kazakh white-headed and Angus (limited liability partnership the breeding plant "Balkashinsky"), Kazakh white-headed and gerefordsky (Sandyktau LLP) of breeds.

Experiences captured bull-calves and heifers of the called breeds during the period from the birth to the 15th monthly age. Researches were carried out with application of the general zootechnical methods and techniques [4]. Determination of live mass of experimental animals was carried out in the morning to a unsoldering and feeding (in two adjacent days).

All obtained data were processed by a biometric method [5].

The received results of researches. One of the main criteria of adaptation of animals to the changed conditions of the environment is their efficiency. In meat cattle breeding it is intensity of growth and

achievement of high sizes of live weight in certain age. At the same time it is known that process of acclimatization and adaptation continues a long time – during not less than two generations of animal husbandry in new natural and technological conditions [6,7,8].

In comparative aspect the efficiency of thoroughbred breeding heifers Angus and Kazakh white-headed breeds was studied. In Balkashinsky LLP, the Akmola region, under experience there were 83 bull-calves and 42 heifers the Angus and also 61 bull-calf and 44 heifers Kazakh white-headed breeds. Indicators of their efficiency from the birth to 8 and 15 months of age, with coverage of 4 months of winter-stall and 3 months summer-pasturable the periods (table 1, 2) are established.

Table 1 – Efficiency of heifers Angus and Kazakh white-headed breeds during the period from the birth up to 15 months of age (Balkashinsky LLP)

Indicator	Age	Breed, quantity			
		Kazakh white-headed (n=44)		Aberdeen-Angus (n=42)	
		M±m	Cv	M±m	Cv
Liveweight, kg	At the birth	22,9±0,3	9,03	19,0±0,2	5,1
	8	205,7±1,5	4,8	187,6±1,0	3,5
	12	273,1±0,9	2,1	273,5±0,4	1,04
	15	328,3±1,5	3,1	321,4±2,2	4,3
Average daily gain of weight, g	0-8	761,7±6,3	5,5	702,6±4,2	3,9
	8-12	562,3±13,8	16,2	715,6±9,4	8,5
	12-15	612,6±15,8	17,1	532,3±25,0	30,4
	8-15	584,0±9,1	10,2	637,1±10,6	11,0
	0-15	678,7±3,4	3,4	671,9±4,8	4,6

When studying efficiency of young growth domestic Kazakh white-headed and the imported Angus and gerefordsky breeds some distinctions caused by conditions of feeding and keeping in different basic farms are established and also to the impacts of adaptation processes.

Heifers Angus and Kazakh white-headed breeds showed rather high efficiency for the entire period of controlled cultivation. Average daily gains from the birth up to 15 months of age respectively were: 671.9 g and 678.7 g, i.e. in pedigree aspect this indicator considerably did not differ. In Kazakhstan 135 alleles, from them typical alleles 124 were identified (91.85%). At the same time it is established that population Aberdeen - the Angus breed has a genetic variety on the following indicators: average of alleles – 12.27, heterozygotic – 0.8758, accidental inbreeding – 0.0022 (9).

In the analysis of data of dynamics of live mass of bull-calves of the Angus breed, in comparison with analogs of the Kazakh white-headed, some of their distinctions on the age periods are noted.

Table 2 – Indicators of efficiency of bull-calves Angus and Kazakh white-headed breeds from the birth up to 15 months of age (Balkashinsky LLP)

Indicator	Age	Breed, quantity			
		Kazakh white-headed (n=61)		Aberdeen-Angus (n=83)	
		M±m	Cv	M±m	Cv
Liveweight, kg	At the birth	25,2±0,2	7,3	21,5±0,2	6,5
	8	227,5±1,6	5,5	209,7±1,2	5,3
	12	322,7±0,6	1,4	324,2±0,4	1,2
	15	384,4±2,2	4,5	379,8±1,5	3,7
Average daily gain of weight, g	0-8	843,2±5,02	4,7	784,1±5,2	6,1
	8-12	792,9±11,5	11,3	954,2±10,1	9,7
	12-15	685,8±26,1	29,7	618,5±12,1	17,9
	8-15	747,1±12,8	13,4	810,3±7,3	8,2
	0-15	798,2±4,9	4,8	796,3±2,5	2,9

For the entire period of controlled cultivation (from the birth up to 15 months of age), some superiority in the live weight and average daily gains, was established on groups of young growth of the Kazakh white-headed breed. On bull-calves it made 4.6 kg (1.2%) and 2.0 g (0.2%); to heifers – 6.9 kg (2.1%) and 6.8 g (1.0%), respectively. Advantage in indicators of live weight at young growth of the Kazakh white-headed breed quite explainably their best fitness to local conditions of feeding and contents. From all groups of experimental animals, superiority on intensity of growth for the registration period, is noted at young growth of the Kazakh white-headed breed that, according to us, is a consequence of the continuing adaptation of the Angus cattle to the new habitat.

In basic economy of institute of livestock production of Sandyktau LLP of the Akmola region under experience there were heifers of Kazakh white-headed (n=20) and gerefordsky (n=24) of breeds. Controlled cultivation happened during the summer pasturable period of contents (table 3).

Table 3 – Dynamics of live mass of heifers gerefordsky and Kazakh white-headed breeds (Sandyktau LLP)

Group, breed	n	Liveweight, kg				Average daily gain, g
		12 months		15 months		
		M±m	Cv	M±m	Cv	
I gerefordsky	24	288,2±4,5	7,6	354,2±2,4	3,4	733,3
II Kazakh white-headed	20	278,4±2,05	3,3	343,6±2,0	2,6	724,4

By results of observations of heifers gerefordsky and Kazakh white-headed breeds it is established that analogs grew in identical pasturable conditions and developed rather well, having shown the following average daily gains of weight for the controlled period: the Kazakh white-headed – 724.4 g; gerefordsky – 733.3 g. It should be noted that on indicators of live weight, in 12 months age, some differences between groups were observed: gerefordsky heifers at this age surpassed Kazakh white-headed on 9.8 kg (3.4%). The difference in live weight was shown as well on completion of 3-month maintenance on a pasture: in 15 months age advantage on live weight in favor of Herefords made 10.6 kg (2.9%), on average daily gain of weight for the registration period, respectively, 8.9 g and 1.2%.

Conclusions. From the researches conducted above results it is visible that adaptation qualities of the specialized meat cattle imported to Kazakhstan are shown ambiguously that substantially is defined by various genotypic accessory of the delivered cattle and also conditions of feeding and maintenance. In whole - processes of adaptation of an import livestock proceed well.

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ҚАЗАҚСТАНДАҒЫ ҚАЗАҚТЫҢ АҚ БАС, ГЕРЕФОРД ЖӘНЕ АБЕРДИН-АНГУС ТҰҚЫМДАРЫНЫҢ МАМАНДАНДЫРЫЛҒАН ЕТТІ МАЛЫНЫҢ ӨНІМДІЛІГІНІҢ САЛЫСТЫРМАЛЫ КӨРСЕТКІШТЕРІ

Аннотация. Етті мал шаруашылығы соңғы жылдары Қазақстан Республикасында қарқынды даму алған мал шаруашылығының басым саласы болып табылады. Зерттеудің мақсаты отандық және импорттық тұқымды етті ірі қара мал төлінің өнімділік және асыл тұқымдық сапасын зерттеу болып табылады. Зерттеу нәтижелерінің практикалық маңыздылығы жоғары сапалы ет өнімдерін өндіруді арттыру болып табылады. Мақалада отандық қазақтың ақ бас төлінің өсуі мен дамуы, сондай-ақ ангус және герефорд тұқымдарының асыл тұқымды малдарының импорты бойынша Қазақстанға әкелінген ұрпақтарын салыстырмалы зерттеу материалдары берілген. Республикаға импортталған етті малдың төлдері жалпы генетикалық жағынан негізделген пайдалы қасиеттерін сақтайды, алайда кейбір көрсеткіштер бойынша қазақтың ақбас тұқымының негізгі отандық тұқымының аналогтарынан ерекшеленеді, бұл әкелінген генотиптердің тіршілік ету ортасының жаңа жағдайларына бейімделуінің жалғасып келе жатқан процесімен байланысты.

Түйін сөздер: етті тұқымдар, Ангус, Герефорд, қазақтың ақ бас сиыры, өнімділік, бейімделу, сынау, жақсартқыштар.

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СРАВНИТЕЛЬНЫЕ ПОКАЗАТЕЛИ ПРОДУКТИВНОСТИ СПЕЦИАЛИЗИРОВАННОГО МЯСНОГО СКОТА КАЗАХСКОЙ БЕЛОГОЛОВОЙ, ГЕРЕФОРДСКОЙ И АБЕРДИН-АНГУССКОЙ ПОРОД В КАЗАХСТАНЕ

Аннотация. Мясное скотоводство является приоритетной отраслью животноводства, получившей в последние годы интенсивное развитие в Республике Казахстан. Целью исследований явилось изучение продуктивных и племенных качеств молодняка мясного крупного рогатого скота отечественных и импортных пород. Практическая значимость результатов исследований заключается в увеличении производства высококачественной мясной продукции. В статье изложены материалы сравнительного изучения роста и развития молодняка отечественной казахской белоголовой, а также потомства завезенных в Казахстан по импорту племенных животных ангусской и герефордской пород. Установлено, что молодняк импортированного в республику мясного скота в целом сохраняет свои генетически обусловленные полезные качества, однако отличается по некоторым показателям от аналогов основной отечественной породы казахской белоголовой, что обусловлено продолжающимся процессом адаптации завезенных генотипов к новым условиям среды обитания.

Ключевые слова: мясные породы, ангусская, герефордская, казахская белоголовая, продуктивность, адаптация, испытания, улучшатели.

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THE MAIN DIRECTIONS OF DEVELOPMENT OF SPECIALIZED MEAT CATTLE BREEDING IN KAZAKHSTAN

Abstract. The main conditions of successful development of meat cattle breeding in the Republic of Kazakhstan, consist in increase in number of the meat cattle at the expense of the accelerated reproduction and creation of new breeding herds of domestic breeds (Kazakh white-headed and auliyekolsky), expansion of a genetic variety and increase in the massif of breeding animals with formation of thoroughbred reproductive herds of specialized meat breeds of foreign selection. Improvement of genetic potential of the meat cattle has to be carried out on the basis of use of effective methods and methods of selection, removal of new selection achievements, development of optimum technologies of contents and diets of feeding, application of modern ways of a reproduction and assessment of breeding value of animals.

Key words: meat cattle breeding, breeding livestock, technology, breed, animals, pasture.

On the scale of development of world economy demand for food steadily increases in proportion to increase in population of the planet. In food balance of the person an important role is played by the meat products and especially meat beef received from cultivation of the cattle of specialized meat breeds. More than a half of all beef produced in the world is the share of the USA, China, Argentina, Australia and Brazil. The greatest number of beef is imported now by the USA and Russia (more than one million tons per year), then there are Japan, Italy, France, Holland, Egypt, Germany, Mexico and Great Britain (import of beef to these countries fluctuates from 357 to 719 thousand tons per year). Kazakhstan in this list is in the 52nd place and import of beef to our country makes no more than 14-15 thousand tons annually. Follows separately will stop on the export countries of high-quality beef: these are generally the countries having considerable fodder resources, first of all having the existence of cheap pasturable forages developed by production of grain and field forage production. The following export states of beef can be carried to such countries: Brazil (898 thousand tons per year), Australia (702 thousand tons), India (452 thousand tons), New Zealand (345 thousand tons) and Argentina (170 thousand tons). Proceeding from existence of extensive natural pastures, these countries not only completely provide internal requirements, but also have essential income from realization of beef in foreign markets.

In this regard Kazakhstan having a significant amount of natural pastures, numerous country people and having favorable and long-term partners in realization of high-quality beef in the person of Russia and China can the next decade will take place as the serious producer and the supplier of high-quality beef in the Central Asian and Eurasian regions. For achievement of these purposes in Kazakhstan there is a need the accelerated rates to develop specialized meat cattle breeding which as independent branch of livestock production, began to be created in the republic in the 30th years of the last century when by reproductive and absorbing crossing of the local (native) Kazakh and Kalmyk cattle with Herefords it was created and in 1950 the Kazakh white-headed breed is approved. Animals of this first domestic breed combined the excellent meat qualities and precocity inherited from Herefords and also characteristic to the local cattle

adaptive and maternal properties. It allowed to part successfully breed in all regions of the Republic having extensive natural pastures [1].

With development virgin and laylands in the 50-60th years, the areas of natural fodder grounds in a traditional zone of meat cattle breeding it was considerably reduced. It set the task of the transfer of the industry on intensive methods of maintaining at which animals not only receive forages on pastures of natural grounds, but as well from field forage production. Large industrial complexes on production of beef and specialized farms on sagination were created. Before transition to market economy in the republic there were 1 million 144 thousand beasts of this breed, including 440 thousand cows. Now the number of the cattle of the Kazakh white-headed breed fluctuates within 180-200 thousand heads. Animals are characterized by high reproductive, feeding and feeding qualities. Bull-calves and heifers when depriving from mothers at 7-8 monthly age reach live weight of 200-240 kg. The young growth at cultivation on natural organized on good pastures, without fertilizing by concentrates, gives 800-900 g of average daily gain of weight, and on sagination – 1000 and more.

The intensive technology of maintaining meat cattle breeding demanded creation of new highly productive genotypes, increase in level of selection and breeding work, the direction of selection and the requirement to the meat cattle changed. If earlier paramount significance was attached to precocity of animals, then now to the forefront there were indicators of intensity of growth in combination with final big weight. Therefore activity of domestic scientists and production workers selectors goes for improvement of breeding and productive qualities of the meat cattle domestic, deliveries adaptation of the imported breeds [2].

At the heart of selection of the meat cattle on the intensity of growth which is positively correlating with other signs (payment of a forage, live mass and big mass of hulks) two-stage selection of bulls by means of their tests on own efficiency and quality of posterity is put. Use of this method in selection of domestic breeds yields positive results. The manufacturing bulls improving the main signs of selection in posterity were revealed, their sons with intensity of growth till 1300 on average per day with expense of a forage of 6.9-7.2 fodder units are grown up and tested on efficiency. The obtained data indicate high genetic opportunities of domestic breeds in general and in particular separate breeding herds. About same indicators of record-holder animals testify: bulls with a live weight of 1200-1400 kg, cows of 800-1000 kg. However in most farms, owing to shortcomings of technological character, the hereditary potential of the domestic meat cattle is implemented for 50-60%.

In 1992 one more domestic breed of the meat cattle – auliyekolsky, removed by difficult reproductive crossing was approved. A basis of creation of auliyekolsky breed were three meat breeds – Kazakh white-headed, to the sharola and Aberdeen-Angus [3].

Animals of new breed combine good fitness to local climatic and fodder conditions, high quality of meat Kazakh white-headed, precocity Angus, the big mass and intensity of growth sharolezsky breeds. Animals of auliyekolsky breed hornless, with light-pale-yellow color, sometimes with a cream shade, are classified as large by size. The live mass of bulls is in limits of 900-1200 kg, adult cows of 530-600 kg, young growth when depriving in 7-8 months of 200-240 kg, bull-calves on sagination give to 960-1400 g of average daily gain of weight with exit of ink 58-64%.

The breed was widely adopted in the Kostanay, North Kazakhstan, Almaty, Karaganda and Akmola regions of the republic.

In 2005 in structure of breed auliyekolsky two factory lines which young growth has the high intensity of growth inherited by generations of descendants are created: average daily gain of mass of bull-calves from 8 to 15 months – 1026g, or above unrelated to them peers for 9.4%, and the standard of breed – for 36.8%; spend forages for gain unit for 4.2% less; reach by 15 months of average weight of 429.7 kg, surpassing the compared analogs on 18.5 kg (4.5%) and the standard of breed – on 54.7 kg (14.6%).

Except two main domestic breeds, in the republic there are herds of breeding animals of domestic selection, small on number: the Kalmyk breed – in the semidesertic region of the Southern Kazakhstan area, Santa-gertruda (the zone Zhetysu type) – in Pribalkhashye, galloveysky – in the mountain region of Almaty region, gerefordsky – in West Kazakhstan, areas. Tasks of breeding work with these breeds – expansion of a genetic variety at thoroughbred cultivation and creation of meat herds by crossing from scotomas of local populations.

Unlike other breeds the intra pedigree structure of zhetysusky type of breed of a santa-gertrud differs in an allelic range of INRA23, ETH3, SPS115, ETH225, BM2113. The analysis of the studied population and genetic structures of zhetysusky type of breed of KRS of a santa-gertrud confirmed presence of the differentiated groups of animals in various subpopulations (farms) [4].

Parallel to the measures taken for the accelerated development of domestic meat cattle breeding at the initiative of the Ministry of Agriculture of RK since 2011 the "Development of the Export Potential of Meat of Cattle for 2011-2020" project providing increase in genetic potential of the meat cattle due to improvement and replication of a gene pool of domestic meat breeds and types (Kazakh white-headed, auliyekolsky, the Zhetysu type), and also accelerated expansion of breeding herd with delivery of a uterine livestock on import and creation of network of breeding farms is carried out.

The project plans increase in number of the meat cattle by 2020 to 61% of the general herd of cattle (now this indicator is 8-10%), bringing the export potential of beef to 180 thousand tons by 2020.

Now in the general number of cattle (6.0 million heads) about 7.0-8.0% or 420-480 thousand heads fall to the share of specialized meat. In the countries with the developed branch of meat cattle breeding (Canada, Brazil, the USA, Australia), the livestock of the meat cattle makes more than 20 million heads, and it is the share of one dairy animal 5-6 meat. In our case this ratio makes 1:7, in favor of dairy cattle breeding that very eloquently demonstrates low efficiency of dairy herd and poor development in Kazakhstan of branch of meat cattle breeding.

The number of a breeding livestock in meat cattle breeding is presented as follows: all breeding meat cattle not of many more than 440 thousand heads, including a uterine livestock – about 245 thousand. From the general livestock of the breeding meat cattle about 56.8% (250.0 thousand heads) are occupied by the Kazakh white-headed breed; 9.8% (49.0 thousand heads) are the share of the auliyekolsky cattle; 4.8% (21.2 thousand heads) Zhetysu type; 0.1% (521 heads) galloveysky cattle of domestic selection and 0.8% (3.7 thousand heads) Kalmyk cattle. 27.6% (121.6 thousand heads), generally Angus (76.3 thousand and 17.3%) and gerefordsky (44.4 thousand and 10.1%) breeds are the share of the import cattle. Such good point is very important that practically all imported meat cattle (more than 90%), is presented by a uterine livestock. It is also necessary to note that only at the expense of the delivery of the cattle of import meat breeds which is carried out recently, the breeding livestock of republican population of the meat cattle increased almost twice.

In this regard, the decision on delivery from abroad of a uterine livestock of meat breeds to which, despite big expenses, our Government went, it is necessary to perceive as a good point in development of the industry, but it is necessary to use it elaborately, scientifically and almost reasonably.

In the light of the designated directions of development of domestic meat cattle breeding, the “Sybaga” program providing increase in a breeding livestock of the meat cattle by method of absorbing crossing of a local uterus with bulls of specialized meat breeds is implemented by the Ministry of Agriculture of RK.

Thus the Government and the Ministry of Agriculture of RK undertake the considerable measures for the fastest growth of the branch of meat cattle breeding including preservation and development of own gene pool of meat breeds, and also formation of breeding base on the basis of delivery of the best world genotypes of the meat cattle.

Analyzing the basic principles of selection and breeding work in meat cattle breeding of Kazakhstan and the leading foreign countries, it is possible to come to a conclusion that in general the directions of selection are similar and are based on the general concepts since selection and selection of animals at phenotypical and genotypical assessment, the directed cultivation of young growth, consolidation and development of heredity of signs of selection. However for a number of the objective reasons, results of selection of the meat cattle in Kazakhstan are also abroad extremely ambiguous.

Organizational structure. In the countries with the developed meat cattle breeding, in particular in the USA, under control of the Ministry of Agriculture the complete organizational system of large cooperatives for improvement of the cattle including the companies on artificial insemination, sterns and veterinary science, pedigree associations, the universities, the centers of account, laboratory works. Cooperatives include the registered farms corresponding to a number of requirements: gene pool of herds, technologies of contents, security with sterns, to the level of breeding work, etc.

That system is not in Kazakhstan. In a rudimentary stage there is an introduction of large-scale selection, scientific ensuring selection and breeding work is carried out by very limited circle of erudite and

highly skilled practicians that does not give appropriate effect. In this regard big achievement is the organization of the information and analytical system (IAS) which widely takes root now in a number of farms practically of all regions of RK and also creation of republican chambers on the main meat breeds [5].

Reliability of information. Attaching due significance to the IAS system in the organization of large-scale selection, its effectiveness will be is shown only at exhaustive reliability of the data on all major events of production obtained from farms. It first of all concerns accurate and continuous identification of animals, availability of data on origin on a mother's and father's side, calving registrations, the copulations given about growth and development, etc. In the USA such information comes from farmers to the breeding centers on mutual trust therefore defects of breeding work, feeding and the contents which quickly are eliminated with participation of exit scientists and experts come to light. In case of not full or unreliable information farms are excluded from "system", and the last complicates receiving the credits by farmers.

Index assessment of breeding value of animals. Its application in a number of the countries provides results on all population of the animal registered farms, predetermines existence of the centralized organizational structure and exact information on animals in general on breed or population. And a phenotype and furthermore a genotype, authentically it is possible to estimate only at cultivation of animals with application of the unified feeding in all controlled farms on the diets providing manifestation of potential of efficiency, in particular to intensity of growth, not less than 1000 g in day. In Kazakhstan, scientists of institute of livestock production develop techniques and instructions of index assessment of the meat cattle. It is developed and step by step the control system of breeding process in meat cattle breeding of Kazakhstan takes root.

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ҚАЗАҚСТАНДАҒЫ МАМАНДАНДЫРЫЛҒАН ЕТТІ МАЛ ШАРУАШЫЛЫҒЫН ДАМЫТУДЫҢ НЕГІЗГІ БАҒЫТТАРЫ

Аннотация. Қазақстан Республикасында етті мал шаруашылығын табысты дамытудың негізгі шарттары тездетіп өсіру және отандық тұқымдардың (қазақ ақбас және әулиекөл) жаңа асыл тұқымды табындарын құру есебінен етті мал санын арттыру, шетелдік селекцияның мамандандырылған ет тұқымдарының таза тұқымды репродукторлық табындарын қалыптастыра отырып, генетикалық әртүрлілікті кеңейту және асыл тұқымды малдардың массивін ұлғайту есебінен етті мал санын арттыру болып табылады. Етті малдың генетикалық әлеуетін жетілдіру селекцияның тиімді әдістері мен тәсілдерін пайдалану, жаңа селекциялық жетістіктерді шығару, асыраудың оңтайлы технологияларын және азықтандыру рациондарын әзірлеу, жануарлардың асыл тұқымдық құндылығын репродукциялау мен бағалаудың қазіргі заманғы тәсілдерін қолдану негізінде жүзеге асырылуы тиіс.

Түйін сөздер: ет мал шаруашылығы, асыл тұқымды мал, технология, тұқым, мал, жайылым.

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ОСНОВНЫЕ НАПРАВЛЕНИЯ РАЗВИТИЯ СПЕЦИАЛИЗИРОВАННОГО МЯСНОГО СКОТОВОДСТВА В КАЗАХСТАНЕ

Аннотация. Основные условия успешного развития мясного скотоводства в республике Казахстан заключаются в увеличении численности мясного скота за счет ускоренного воспроизводства и создания новых племенных стад отечественных пород (казахской белоголовой и аулиекольской), расширении генети-

ческого разнообразия и увеличении массива племенных животных формированием чистопородных репродукторных стад специализированных мясных пород зарубежной селекции. Совершенствование генетического потенциала мясного скота должно осуществляться на основе использования эффективных методов и приемов селекции, выведения новых селекционных достижений, разработки оптимальных технологий содержания и рационов кормления, применения современных способов репродукции и оценки племенной ценности животных.

Ключевые слова: мясное скотоводство, племенное поголовье, технология, порода, животные, пастбище.

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AGROTECHNOLOGICAL PECULIARITIES OF SOYBEAN CULTIVATION IN THE IRRIGATED ZONE OF SOUTH AND THE SOUTHEAST KAZAKHSTAN

Abstract. The technology of cultivating Lastochka, highly productive variety of soybean, was compared with the furrowing irrigation with dripping irrigation based on renewable water energy and three different seeding rates.

The high yield of soybean variety Lastochka was 54.6 c/ha with the dripping irrigation under Ili Alatau, and 51.6 c/ha with an optimal 400 thousand pcs/ha seeding rate under the conditions of the Kyrgyz Alatau.

Keywords: irrigated agriculture, drip (trickle) irrigation, soybean, seeding rate, sowing technology, crop capacity.

Introduction. Soybean is an economically profitable crop which is produced without nitrogen fertilizers. It does not require the cost of compensation for damage to the environment and contributes to its preservation [1]. Also, it is in steady demand in the world market. Soybean production is profitable in all parts of the country. Profitability of production reaches up to 200%. Man cultivation of soybeans contributed to the detailed development of agricultural methods of its cultivation. The work of many farmer generations and national breeders turned this plant into a culture, which is well adapted to the mechanization of all cultivation technological processes, from planting to harvesting [2].

Soybean plants are subject to a number of abiotic and biotic stresses that affect to their growth and development. In particular, water deficiency is the main global abiotic factor affecting the productivity of all crops, particularly soybean [3]. According to the data of many authors, soil moisture, which is close to the lowest water capacity, has the highest tolerance for plants. As noted by many researchers, moisture is one of the main and irreplaceable factors of plant life [4]. Drip irrigation is one of the methods of irrigation, in which water in small portions is supplied evenly to the roots of the plant throughout the growing season and irrigation moisture is supplied only to the plants, and is not consumed in the row spacing [5]. Taking into account the potential of soybean productivity, water combinations and soil food regimes were determined, which ensure the formation of a yield of 3-4 t/ha of seeds. For this range of productivity, the regularity of the soybean formation evapotranspiration, the main parameters of drip irrigation regimes, the numerical values of the specific water consumption per unit of marketable products established the regularity of the yield formation of soybean seeds depending on the irrigation regime, the level of mineral nutrition and tillage [6].

Materials. The experience was laid in 2 areas of irrigated agriculture of the south and south-east Kazakhstan in 2016-2018. The piedmont irrigated zone of the Kyrgyz Alatau (farm "Nurzhan", district Merken, Zhambyl region) on gray soils and the piedmont irrigated zone of Ili Alatau (demonstration site of the Kazakh Research Institute of Agriculture and Plant Growing) on bright chestnut soils;

The soybean variety Lastochka, which belongs to the group of medium late (III group of ripeness), was studied and it was approved for the use in Almaty, Zhambyl and South Kazakhstan regions.

The following measures were taken to prepare the soil for sowing soybean: dump plowing to a depth of 25-27 cm and pre-sowing treatment to a depth of 12-15 cm.

Direct sowing was done using a combination seeder Vence Tudo (Brazil), two-sided seeding method 50x20 cm, 3 seeding rates (400 thousand pcs/ha, 500 thousand pcs/ha, 600 thousand pcs/ha), 2 irrigation methods (dripping and furrowing).

Results. The definition and assessment of the density of the foothill bright chestnut irrigated soil of the Ili Alatau from the beginning of sowing and before the soybean harvest revealed that the indicators of the bulk weight of 0-30 cm layer with dripping irrigation were less than with furrowing.

The volume mass of the dripping irrigation increased by 0.03 g/cm^3 During the growing season, while during furrow irrigation it increased from 1.21 g/cm^3 from the beginning of the growing season to 1.32 g/cm^3 by the end of the growing season, i.e. 11 g/cm^3 (figure, table 1).

The study of soil density in two zones of irrigated agriculture

Table 1 – The change in the density of the foothill bright chestnut irrigated soil of the Ili Alatau (station of KazRIAPG) and the Kyrgyz Alatau (station of farm "Nurzhan") depending on plowing and irrigation methods, g/cm^3 (average 2016-2018 years)

Ways of irrigation	The beginning of the growing season		Middle of the growing season		Before harvesting culture	
	layer, cm	bulk weight	layer, cm	bulk weight	layer, cm	bulk weight
The Ili Alatau (station of KazRIAPG)						
Drip watering	0-10	1,16	0-10	1,17	0-10	1,19
	10-20	1,20	10-20	1,22	10-20	1,25
	20-30	1,27	20-30	1,27	20-30	1,28
	0-30	1,21	0-30	1,22	0-30	1,24
Furrow watering	0-10	1,15	0-10	1,21	0-10	1,28
	10-20	1,22	10-20	1,28	10-20	1,32
	20-30	1,26	20-30	1,32	20-30	1,36
	0-30	1,21	0-30	1,27	0-30	1,32
The Kyrgyz Alatau (station of farm "Nurzhan")						
Drip watering	0-10	1,14	0-10	1,16	0-10	1,19
	10-20	1,20	10-20	1,23	10-20	1,25
	20-30	1,26	20-30	1,27	20-30	1,28
	0-30	1,20	0-30	1,22	0-30	1,24
Furrow watering	0-10	1,13	0-10	1,21	0-10	1,25
	10-20	1,21	10-20	1,27	10-20	1,31
	20-30	1,26	20-30	1,30	20-30	1,34
	0-30	1,20	0-30	1,26	0-30	1,30

A slight increase in the density of 0–30 cm of the soil layer was also observed with dripping irrigation from the beginning of the soybean vegetation period and before harvesting as compared with furrowing irrigation on the piedmont bright chestnut irrigated soil of the Kyrgyz Alatau.

Thus, the studies conducted in the foothill bright-chestnut irrigated soils of the Ili and Kyrgyz Alatau showed that dripping irrigation provided the creation of an optimal density of 0-30 cm layer, whereas in the furrowing irrigation its size went beyond the optimal indicators by the end of the growing season.

The elements of productivity are the main indicators of the biological yield of plants. Their formation depends on both genetic characteristics and external growth parameters. Irrigation methods had an impact on all signs of productivity, starting from the height of the plant and ending with the mass of seeds from the plant (table 2).

Table 2 – Comparative assessment of the productivity elements of soybean variety Lastochka, depending on the seeding rate and irrigation method

Ways of irrigation	Seeding rate thousand pcs/ha	Height, cm	Attachment height of lower beans, cm	Seed weight per plant, g	Weight 1000 seeds, g
Kyrgyz Alatau "Nurzhan" farm					
Drip watering	400	90,5	8,0	23,0	163,5
	500	90,2	7,8	19,5	165,4
	600	100,3	7,4	20,5	165,8
Furrow watering	400	85,4	5,6	21,6	163,2
	500	90,3	10,6	19,7	167,8
	600	105,6	9,5	15,4	165,4
Ili Alatau station (KazRIAPG)					
Drip watering	400	90,5	12,2	28,0	164,5
	500	95,2	12,8	24,5	166,4
	600	105,3	12,4	25,5	166,8
Furrow watering	400	90,4	10,6	26,6	164,2
	500	95,3	13,6	24,7	168,8
	600	110,6	14,5	20,4	166,4

The height of the plants in the Kyrgyz Alatau of the variety Lastochka was formed depending on the seeding rate and irrigation method in the range from 85.4 to 105.6 on dripping irrigation; moreover, the highest indicator was formed in thickened sowing at a seeding rate of 600 thousand pcs/ha. The height was higher under the conditions of the Ili Alatau. It was within 90.4-110.6 cm depending on the experience. The increased competition in the thickened sowing led to the stretching of the plants and their subsequent lodging. The height of the plants was 85-95 cm in sparse crops with a seeding rate of 500 and 400 thousand plants/ha.

The height of the lower bean sticking plays a major role for plants in the mechanized soybean harvest. the height of the lower bean sticking was within 7.4 -10.6 cm under the conditions of the Kyrgyz Alatau. It was 10.6 to 14.5 cm under the conditions of the Ili Alatau. The high indicators of this feature were characteristic of thickened crops as well as the height of the plant.

Seed productivity is determined by the mass of seeds per plant, so this indicator is the most important economically valuable attribute of all crops. According to N. Korsakov, the number of beans per plant is also a relative indicator when characterizing its productivity. It is used within samples with the same size of seeds, since the mass of 1000 seeds and the number of seeds in a bean has a wide range of variation. Therefore, in all other cases, an indicator of seed mass per plant is used determining the productivity of a plant. The variety Lastochka has a seed mass from a plant with dripping irrigation ranging from 19.5 to 23.0 g; with furrowing irrigation from 15.4 to 21.6 g under the conditions of the Kirghiz Alatau. The mass of seeds from one plant ranges from 24.5 to 28.0 g with dripping irrigation, and with furrowing irrigation from 20.0 to 26.6 g under the conditions of the Ili Alatau. The highest indicators of seed mass from a plant were formed at a seeding rate of 400 thousand seeds/ha with dripping irrigation.

The variety Lastochka is a medium seed with a mass of 1000 seeds 155-165 g by seed size. Different types of irrigation and seeding rates do not reveal significant differences on this basis. Sufficient moisture supply leads to the formation of a complete seed loading and to the formation of a genetically programmed trait.

Productivity is the main indicator for assessing the effect of an external trait on a plant. The yield was in the range of 45.2 to 51.6 c/ha with dripping irrigation depending on the seeding rate under the conditions of the Kyrgyz Alatau and it was 48.2 to 54.6 c/ha under the conditions of the Ili Alatau. Moreover, the highest yield was obtained at a seeding rate of 400 thousand seeds/ha (51.6 and 54.6 c/ha).

The yield was in the range of 38.6 to 43.6 c/ha with furrowing irrigation depending on the seeding rate under Kyrgyz Alatau conditions, and it was from 42.3 to 46.6 c/ha under the conditions of the Ili Alatau. A variant with a seeding rate of 400 thousand seeds/ha (table 3) was characterized by high yield with this method of irrigation.

Table 3 – Comparative assessment of the soybean variety yield Lastochka, depending on the seeding rate and irrigation method

Ways of irrigation	Seeding rate thousand pcs/ha	Kyrgyz Alatau yield t/ha	Ili Alatau yield t/ha
Drip watering	400	***51,6***	***54,6***
	500	48,6	51,6
	600	45,2	48,2
Furrow watering	400	***43,6***	***46,6***
	500	39,3	42,3
	600	38,6	43,6

Conclusion. Drip irrigation, compared to furrow irrigation, is a positive effect on the signs of productivity and ultimately on the yield by a water-saving irrigation method due to the even supply of water to the roots of plants. Intra varietal competition occurs in the thickened crops with a seeding rate of 600 thousand plants/ha, thus plants are stretched and become prone to lodging, fewer beans are formed on them and, as a result, the yield is reduced. Optimal conditions are formed to achieve maximum yield with sparse sowing with a seeding rate of 400 thousand plants/ha.

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ҚАЗАҚСТАННЫҢ ОҢТҮСТІК ЖӘНЕ ОҢТҮСТІК-ШЫҒЫСЫНДА СУАРМАЛЫ АЙМАҚТА МАЙ БҰРШАҚТЫҢ ӨСІРУДІҢ АГРОТЕХНОЛОГИЯЛЫҚ ЕРЕКШЕЛІКТЕРІ

Аннотация. Қазақстанның оңтүстігі мен оңтүстік-шығысындағы агроэкологиялық екі аймақта қарықпен суарумен салыстырғанда жаңартылатын су энергиясы негізінде тамшылатып суару кезінде май бұршақ дақылының Ласточка сортты өнімімен өсіру және агротехнологиясын және үш түрлі әдіспен себу нормалары зерттелінді. Іле жағдайында тамшылатып суаруда Ласточка сортының жоғары өнімділігі 54,6 ц/га, Қырғыз Алатауы жағдайында 51,6 ц / га құрады.

Түйін сөздер: суармалы егіншілік, тамшылатып суару, май бұршақ, себу нормасы, себу технологиясы, өнімділік.

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АГРОТЕХНОЛОГИИЧЕСКИЕ ОСОБЕННОСТИ ВОЗДЕЛЫВАНИЯ СОИ В ОРОШАЕМОЙ ЗОНЕ НА ЮГЕ И ЮГО-ВОСТОКЕ КАЗАХСТАНА

Аннотация. В двух агроэкологических зонах юга и юго-востока Казахстана изучена технология возделывания сои высокопродуктивного сорта Ласточка при капельном орошении на основе возобновляемой энергии воды сравнении с бороздковым поливом и 3 различные нормы высева. Установлены высокая урожайность сои сорта Ласточка на капельном орошении в условиях Илийского составила 54,6 ц/га, в условиях Киргизкого Алатау - 51,6 ц/га при оптимальной норме высева 400 тыс.шт/га.

Ключевые слова: орошаемое земледелие, капельное орошение, соя, норма высева, технология посева, урожайность.

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SELECTION OF ACTIVE YEAST STRAINS FOR FERMENTED BEVERAGES FROM PLANT MATERIALS

Abstract. Various fruits and vegetables were used as sources of yeast cultures, which were grown in the Turkestan region, for the fermentation of beverages based on juice. For selection of the yeast cells we used the most acceptable methods such as washing with sterile water and scraping with a sterile scalpel. The sources of yeast cultures used washes from the surface of juice-bearing berries growing in the Turkestan region, as well as fresh juices obtained under sterile conditions, including pomegranate juice, cherry, red cherry, red grapes, watermelon juice, table beet juice, sugar sargo juice. From the 180 isolated yeast species, the majorities are *Saccharomyces* - 159, and 71 pure cultures were isolated. Subsequent study of the morphological features of cells, physiological and biochemical properties, research of antagonistic activity, resistance to antibiotics allowed for further selection of strains. The most active and corresponding by technological parameters were selected: *Saccharomyces cerevisiae* Al-06 (from grapes), *Saccharomyces cerevisiae* Gl-8 (from sargo juice) and *Saccharomyces cerevisiae* -Az-12 (from pomegranate juice). Thus, performed analyzes showed the possibility of using plant materials not only as freshly squeezed juice of pomegranate, cherry, grapes, watermelon juice, sugar sargo juice, but also as sources of active yeast.

Key words: yeast, Saccharomyces cerevisiae, pomegranate, fruit, berries, fermented juice.

Introduction. Analysis of the health status of the population in Kazakhstan shows that many residents of the country have health problems to some extent, which depend on many factors, including their living conditions. At the same time, one of the major factors is the negative impact of the environment on the health of the population. High level of pollution of the environment is a stressful environment for the human body [1]. In this connection, there is an urgent need for the creation of products capable of restoring and strengthening the body. Fruits and vegetables play an important role in nutrition, and the products of their processing, including fermented beverages, occupy an exceptional place.

Under the action of yeast, a number of irreversible metabolic processes occur, leading to significant changes in both biochemical composition and organoleptic characteristics. Skillfully selected yeast strains lead to the transformation of sugars, to their reduction and with the simultaneous enrichment of juices with yeast metabolites, including vitamins, organic acids, alcohols, etc. giving a peculiar, unique taste and aroma to the finished product [1-4].

Since yeasts are natural inhabitants of nature, they can be isolated from water, soil, and plant substrates. Fruits containing various organic acids, sugars and other sources of nutrition for yeast are predominantly populated with yeast. Yeast strains associated with fruit surfaces are capable of converting a wide range of sugars into alcohol, and they can also tolerate a high concentration of alcohol. Although yeasts of different genera Kloeckera, Hansensiaspora, Candida, Pichia are involved in the transformation of sugars into acids and alcohols, but in most cases Saccharomyces species dominate the final fermentation stage than any other yeast [2, 5-8].

There are indications in different areas of research and in every industry regarding the details of proper sampling for microbiological analysis. Depending on the research, choose one or another method of sampling, which allows either to only detect or detect and quantify the yeast organisms in the analyzed substrate [9-11].

Materials and methods. Turkestan region, located in the southern part of the country, since time immemorial is considered a region with a rich variety of flora and fauna [12]. To extract the yeast cells, we used the most acceptable methods, including washing with sterile water and scraping with a sterile scalpel. The sources of yeast cultures used washes from the surface of juice-bearing berries growing in the Turkestan region, as well as fresh juices obtained under sterile conditions, including pomegranate juice, cherry, red cherry, red grapes, watermelon juice, table beet juice, sugar sargo juice [5, 13]. The presence of yeast in them can be set directly under the microscope or after concentrating on centrifuges at a frequency of 2000 rpm for 15–20 minutes. Samples of liquids were taken in sterile vessels.

The general principle of sowing is that the sample is transformed into a state where it can be serially diluted to make it seeding directly onto Petri dishes [14].

Wort agar was used as nutrient media; Sabur agar (glucose-peptone media), mycelium formation was investigated on corn-glucose agar medium. These media are used to fully account for and isolate most types of yeast. The most widely used full-fledged medium for growing yeast is also malt wort. It consists of glucose, fructose, sucrose, maltose, maltotriose and maltotetraose, as well as a small amount of pentoses - arabinose, xylose and ribose. Nitrogen components make up 6-7% dry matter (DM), among them ammonium nitrogen is 2.18-2.44 mg per 100 ml. In the wort there are amino acids, all the main B vitamins and minerals, the content of which depends on the water used. The wort is obtained from breweries not hopped, after filtration. It is diluted with tap water to a concentration of 6-8% of DM [15-19].

Wort agar can be made from dry malt extract. 20 g of the powder is dissolved in 400 ml of hot distilled water containing 12 g of agar, and sterilized at 121 °C for 15 minutes. After sowing, the plates are incubated 24 hours in the usual position so that the agar adsorbs the liquid, and then the Petri dishes are inverted to avoid dropping condensate from the lid to the surface.

Sowing yeast on dense media from the suspension being studied is made with a pipette, with 0.5 ml or one drop of the measured volume in each dish. Always take at least three dishes for each dilution in order to obtain the average number of colonies on one dish. Crops are produced either from suspension with a pipette or loop according to the “draining stroke” principle. A drop of the test suspension containing yeast cells is applied to the surface of the agarized solidified medium in a Petri dish. After that, a sterile glass spatula evenly distribute the drop to the surface. With the same spatula, you can still sow 2-3 dishes in case the first one is very dense growth of colonies [3, 9].

When cultivating yeast, like most living organisms, maintaining a certain temperature is of great importance. At the same time, the overwhelming majority of yeast species belong to the group of mesophilic microorganisms with temperature limits of growth ranging from 2–5 to 30–37 °C and optimum at 26–28 °C. True yeast thermophiles are not known among the yeast, for growth of which temperatures are higher 50–60 °C [5, 7].

The process of isolating a pure culture ends with the transfer from a separate, grown in isolation colony into a test tube. The isolated cultures were examined for cell homogeneity under a microscope, as well as the uniformity of the colonies on the plate during subsequent sieving [10].

Thus, the requirements that must be fulfilled in the work on determining the type of yeast are as follows: before determining each culture should be carefully checked for purity by microscopy and sieving on dense nutrient media; from each source culture, they prepare a so-called control culture by transferring it into a test tube with wort agar and retain its entire work period by definition . When describing morphological traits, standard media and cultivation methods are used, since these traits can vary significantly depending on the medium composition and growing conditions.

Results and discussion. Microorganisms isolated from various plant substrates were mostly separate budding cells, and yeasts were also found, forming pseudomycelium and individual species with a true well-formed mycelium. Among the studied representatives of the yeast were typical representatives of Oosporidium, also met Rhodoturola, capable of forming primitive pseudomycelium, colonies have a pronounced rather bright red or orange color; individual grown colonies in many respects belonged to Candida cells, of which round, slightly elongated, colonies formed on agar are most often cream-colored with a wrinkled surface.

The results of the selection of pure cultures of *Saccharomyces* yeast are presented in table 1.

Table 1 – The results of the selection of pure cultures of yeast *Saccharomyces*

Research raw materials	The number of analyzed colonies on the dishes			Isolated pure cultures
	total	estimated yeast	giving spores	
Pomegranate juice	31	24	16	16
Cherry juice	18	15	15	9
Red grape juice	65	33	24	24
Watermelon juice	11	8	8	5
Beetroot juice	12	8	7	6
Sugar sargo juice	43	32	21	11

Of the 180 different types of isolated yeast, most belong to Saccharomyces 159 and only 21 cultures to Dipodascaceae, 71 pure cultures were isolated.

Since the main goal of this work was the development of a fermented beverage, the selected cultures of microorganisms selectively selected yeast capable of transforming sugars into biologically active substances that are useful for the body. Among the selected cultures, preference was given to representatives of the culture class of *Saccharomycets*, the family of *Saccharomycetaceae.* The sizes of the studied single cultures varied in width on average from 4.5 to 9 μm and in length up to 10 μm. Form predominantly rounded, oval, elongated.

The most acceptable cultures were selected in accordance with their relatively fast ability to ferment fruit juices, where the leading factor was high organoleptic characteristics, natural fruit smell, without the appearance of turbidity or large sediment and a pleasant slightly sour taste (table 2).

The most promising were Saccharomyces cerevisiae strains isolated from grapes, sugar sargo juice and pomegranate juice, which were obtained by multiple passages of individual yeast colonies on solid nutrient media. A further study of the morphological features of the cells, physiological and biochemical

Table 2 – Chemical indicators and tasting evaluation of mixed fruit juices, fermented in experienced yeast

Fruit juice	Kind of Yeast	Volume fraction of ethyl alcohol, %	Mass concentration of sugars, g/dm^3	Mass concentration of titratable acids, g/dm^3	Mass concentration of volatile acids, g/dm^3	Tasting evaluation
Watermelon juice	*Saccharomyces cerevisiae* Al-06	1,5	4,2	5,01	0,45	6
	Saccharomyces cerevisiae Gl-8	2,3	3,1	5,64	0,51	7
	Saccharomyces cerevisiae Az-12	1,6	3,9	5,21	0,54	8
Pomegranate juice	*Saccharomyces cerevisiae* Al-06	2,6	5,8	6,93	0,72	8
	Saccharomyces cerevisiae Gl-8	3,7	4.1	7,82	0,75	8
	Saccharomyces cerevisiae–Az-12	2,8	5,3	6,15	0,78	9
Mixed juice (watermelon-pomegranate)	*Saccharomyces cerevisiae* Al-06	2,3	4,9	5,92	0,55	8
	Saccharomyces cerevisiae Gl-8	3,1	2,7	8,43	0,59	9
	Saccharomyces cerevisiae–Az-12	1,8	4,5	5,15	0,64	10

properties, clarification of the antagonistic activity, resistance to antibiotics made it possible for further selection. As a result, the strains identified as the following strains of the yeast *Saccharomyces cerevisiae* Al-06 (from grapes), *Saccharomyces cerevisiae* Gl-8 (from sugar sargo juice) and *Saccharomyces cerevisiae* Az-12 (from pomegranate juice), belong to the *Saccharomycecececeae* family species Saccharomyces, subspecies cerevisiae according to the "Determinant of Burgi".

Biological species of the genus Saccharomyces are a good model for studying the fundamental biological processes: speciation and adaptability of organisms to the environment. Currently, the genus *Saccharomyces* is clearly defined and includes, in addition to *S. cerevisiae,* the species *S. arboricolus, S. bayanus, S. cariocanus, S. kudriavzevii, S. mikatae* and *S. Paradoxus* [5]. The cultural gene pool of *Saccharomycetes* yeast is represented by *S. cerevisiae* and *S. bayanus* species.

Yeast culture *Saccharomyces cerevisiae* Al-06 (from grapes) grows in 1.5% milk at a temperature of 30 ° C, fermentation of milk does not occur, gas (CO_2) is formed during the fermentation of juices. When they growth in a solid medium, form beige colonies in a round shape 1.5-2.0 mm in diameter. Growth on a stroke is moderate, continuous. The culture has a characteristic smell of yeast. The strain does not form pigments diffusing into the medium (figure 1).

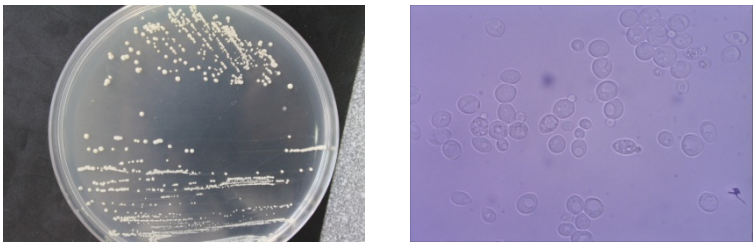

Figure 1 – Culture of the yeast Saccharomyces cerevisiae Al-06 (from grapes)

The average cell size is 6.5×7.2 μm. The shape of the cells is oval and rounded. Reproduces by budding.

On aqueous agar containing sodium acetate cells form asci with spherical spores with smooth shells, 1 to 4 in cell. Colonies are large, smooth, and convex, with smooth edges on the malt wort agar.

Physiological and biochemical properties. Many simple compounds, such as glucose, fructose, galactose, sucrose, glycerin, can be used as a carbon source. As a result of the fermentation of sugars, CO_2 and ethanol are formed.

Features of growth: Temperature optimum is 26 ± 1 °C. Cells grow in the range of 4 to 40 °C. The optimum pH of the medium is 4.5-5.5. Keeps viability in the pH range from 2.0 to 10. It grows when the content of bile in the medium is up to 2.5%.

The cultural and morphological properties of *Saccharomyces cerevisiae* Gl-8 yeast strain (from sugar sargo juice) are the following: On the surface of a solid agar medium, round convex, light cream-colored opaque colonies with a smooth edge, 3-3.5 mm in size, smooth surface, glitters, the consistency is soft, buttery (figure 2).

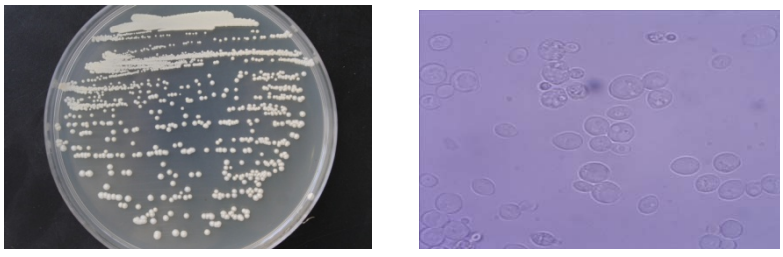

Figure 2 – Yeast culture of *Saccharomyces cerevisiae* Gl-8 (from sugar sargo juice)

The average cell size is 5.0×8.7 μm. The shape of the cells is oval and rounded. Reproduces by budding. On agar medium containing sodium acetate, the cells form aski with spores of spherical shape with smooth shells, 1-4 askies in cell.

Physiological and biochemical properties. Ferments: glucose, sucrose, maltose, galactose, 1/3 raffinose. Does not ferment: lactose and simple dextrins.

Features of growth: Temperature optimum is 26 ± 1 °C. Cells grow in the range of 4 to 40 °C. The optimum pH of the medium is 3.5-5.5. Keeps viability in the pH range from 2.0 to 10. It grows when the content of bile in the medium is up to 2.5%.

Cultural and morphological properties of *Saccharomyces cerevisiae* Az-12 (from pomegranate juice): on the malt wort-agar colonies are small, smooth, convex, with plain edges (figure 3). The average cell size is 5.0 × 6.4 microns. The shape of the cells is mostly rounded. Reproduces by budding. The yeast does not form a yeast spore.

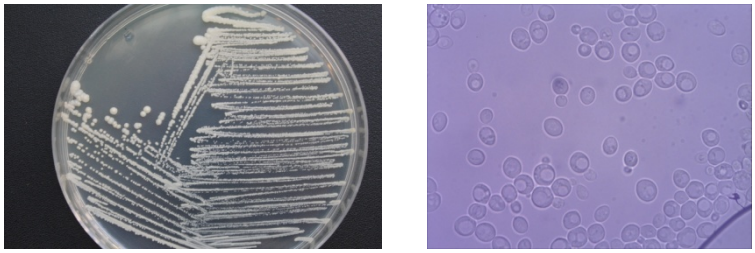

Figure 3 – Culture of Saccharomyces cerevisiae Az-12 yeast (from pomegranate juice)

Physiological and biochemical properties. Ferments: glucose, fructose, sucrose, maltose, maltotriose, does not use galactose, consumes pentose in a small amount - arabinose, xylose and ribose, can use many simple glycerol compounds as a carbon source, as a result of fermentation of sugars it forms CO_2 and ethyl alcohol.

Features of growth: The temperature optimum is 37 ± 1 °C. Cells grow in the range of 5 to 45 °C. The optimum pH of the medium is 3.5-5.5. Keeps viability in the pH range from 1.2 to 10. It grows when the content of bile in the medium is up to 3.0%.

In relation to oxygen, all of the studied strains are optional.

Antibiotic resistance: *Saccharomyces cerevisiae* Al-06 strains are resistant to gentamicin, cefazolin, amoxiclav, tetracycline, norfloxacin, vancomycin, erythromycin, ciprofloxacin, cefuroxime, amphotericin. Show moderate antagonistic properties in relation to *E. coli*.

The strain *Saccharomyces cerevisiae* Gl-8 is resistant to gentamicin, oxacillin, amoxiclav, tetracycline, norfloxacin, vancomycin, erythromycin, ciprofloxacin, metronidazole, ketonazole, amphotericin. It shows pronounced antagonistic properties in relation to *E. coli* и *Staphylococcus aureus*.

Saccharomyces cerevisiae Az-12 is resistant to gentamicin, oxacillin, cefazolin, amoxiclav, tetracycline, norfloxacin, vancomycin, erythromycin, cefotaxime, ciprofloxacin, cefuroxime, metronidazole, ketonazole, amphotericin. They show pronounced antagonistic properties with respect to Escherichia coli, Pseudomonas aeruginosa and *Staphylococcus aureus.*

Thus, performed analyzes show the possibility of using plant materials not only as freshly squeezed juice of pomegranate, cherry, grapes, watermelon juice, sugar sargo juice, but also as sources of active yeast. Of the yeast isolated from plant substrates, the most acceptable from a technological point of view, as well as those with pronounced antagonistic abilities in relation pathogens are *Saccharomyces cerevisiae* Az- 12 и *Saccharomyces cerevisiae* Gl-8

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Conclusion. As a result of the selecting work, *Saccharomyces cerevisiae* strains isolated from grapes, sugar sargo juice and pomegranate juice were chosen and obtained by multiple passages of individual yeast colonies on solid nutrient media and identified as *Saccharomyces cerevisiae* Al-06, *Saccharomyces cerevisiae* Gl-8 и *Saccharomyces cerevisiae* Az-12.

The most promising were Saccharomyces cerevisiae Gul-8 and *Saccharomyces cerevisiae* Az-12 with the ability to ferment fruit juices relatively quickly, and the leading factor was high product quality: organoleptic characteristics, natural fruit odor, no turbidity, and a pleasant slightly sweet, slightly sour taste.

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ӨСІМДІКТІК ШИКІЗАТТАН ДАЙЫНДАЛҒАН ФЕРМЕНТИРЛЕНГЕН СУСЫНДАРҒА АРНАЛҒАН БЕЛСЕНДІ АШЫТҚЫ ШТАММДАРЫНЫҢ СЕЛЕКЦИЯСЫ

Аннотация. Шырындар негізінде жасалған сусындардың ферментациясы үшін, ашытқы культураларының негізгі көзі ретінде, Түркістан облысында өсірілген әртүрлі жемістер мен жидектер пайдаланылды. Ашытқы жасушаларын алу үшін ең қолайлы әдістер қолданылды: стерильді сумен алынған жуынды және стерильді скальпельмен алынған үлгі. Ашытқы культураларының негізгі көзі ретінде, Түркістан облысында өсірілетін, шырыны бар жидектердің бетінен, сонымен қатар, стерильді жағдайларда алынған балғын шырындардың, олардың қатарында анар, шие, қызыл шие, қызыл жүзім, қарбыз, асхана қызылшасы, қант жүгері шырындары, жуындылары қолданылады. Бөлініп алынған ашытқылардың 180 түрінің 159-ы *Saccharomyces,* олардың 71-і таза культура түрінде алынды. Жасушалардың морфологиялық ерекшеліктері, физиологиялық және биохимиялық қасиеттері, олардың антагонистік белсенділігінің айқындалуы, антибиотиктерге тұрақтылығын зерттеу жаңа штаммдардың селекциялануына мүмкіндік береді. Белсенділігі жоғары және технологиялық параметрлерге сәйкес түрлер ретінде мына ашытқылар таңдалды: *Saccharomyces cerevisiae* Al-06 (жүзімнен алынған), *Saccharomyces cerevisiae* Gl-8 (қант жүгерісі шырынынан) және *Saccharomyces cerevisiae* – Az-12 (анар шынынынан). Өткізілген зерттеулер өсімдік шикізатының анар, шие, жүзім, қарбыз, қант жүгерісі шырындары түрінде ғана емес, сонымен қатар белсенді ашытқылардың көзі бола алатындығын көрсетті.

Түйін сөздер: ашытқылар, *Saccharomyces cerevisiae*, анар, жемістер, жидектер, ферментирленген шырындар.

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СЕЛЕКЦИЯ АКТИВНЫХ ШТАММОВ ДРОЖЖЕЙ ДЛЯ ФЕРМЕНТАТИРОВАННЫХ НАПИТКОВ ИЗ РАСТИТЕЛЬНОГО СЫРЬЯ

Аннотация. Для ферментатации напитков на основе сока, в качестве источников дрожжевых культур использовали различные фрукты и овощи, произрастающие в Туркестанской области. Для извлечения дрожжевых клеток нами использовались наиболее приемлемые методы, в том числе смыв стерильной водой и соскоб стерильным скальпелем. В качестве источников дрожжевых культур использовали смывы с поверхности сокосодержащих ягод, произрастающих в Туркестанской области, а также свежих соков, полученных в стерильных условиях, в том числе сок граната, вишни, черешни, красного винограда, арбузный сок, сок столовой свеклы, сок сахарного сарго. Из 180 выделенных видов дрожжей большинство относятся *Saccharomyces* – 159, чистых культур выделено 71. Последующее изучение морфологических особенностей клеток, физиологических и биохимических свойств, прояснения антагонистической активности, устойчивости к антибиотикам дали возможность для дальнейшей селекции штаммов. Наиболее высокоактивные и соответствующие по технологическим параметрам были отобраны: *Saccharomyces cerevisiae* Al-06 (из винограда), *Saccharomyces cerevisiae* Gl-8 (из сока сахарного сарго) и *Saccharomyces cerevisiae* – Az-12 (из гранатового сока). Таким образом, проведенные анализы показали возможность использования растительного сырья не только в качестве свеже выжатых соков граната, вишни, винограда, арбузного сока, сока сахарного сарго, но и в качестве источников активных дрожжей.

Ключевые слова: дрожжи, *Saccharomyces cerevisiae*, гранат, фрукты, ягоды, ферментированный сок.

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THE ANALYSIS OF QUALITY OF SEEDS OF PLANT-SIDERATE LACY PHACELIA (*PHACELIA TANACETIFOLIA* BENTH., 1834) «BAYSERKE-AGRO» LLP WITH THE HELP OF PHYTOEXPERTISE

Abstract. With the results of phytoexamination of seeds of the plant-siderite lacy phacelia *Phacelia tanacetifolia* Benth., 1834, their sowing qualities have been established. Germination energy during the experiments in a humid chamber averaged 68.0 %, laboratory viability comprised on average 72.2 %, the percentage of diseased seeds was 27,0 %. When conducting the experiments on moistened sand, these indicators were slightly lower: germination energy was 39.0 %, laboratory viability decreased to the level of 50.75 %, the number of diseased seeds amounted to 14.5 %. The identified fungal microflora was represented by species from the genera *Mucor, Penicillium, Alternaria* and *Fusarium*, bacterial microflora was represented by representatives of the genera *Pseudomonas* and *Erwinia*. The revealed microflora creates an infectious background for molding seeds, damaging plants with root rot, *Fusarium*, *Alternaria* and bacteriosis during the growing season, and also worsens the sowing quality of seeds, reduces the germination of plants and, thereby, significantly reduces the productivity of plants. Based on the results of the phytoexamination carried out against the complex of fungal and bacterial infections, a protective-stimulating composition was selected and the recommendation was given to the workers of the production sector of «Bayserke-Agro» LLP (Almaty region) on the improvement of the lacy phacelia seeds with the PMTD t.me in conjunction with a stimulant, the biological stimulant Extrasol, based on the bacterium *Bacillus subtilis*.

Key words: Phytoexpertise, seeds, siderat, lacy phacelia, *Phacelia tanacetifolia*, «Bayserke-Agro» LLP, Almaty region, Kazakhstan.

Introduction. The currently existing technological maps for the cultivation of fodder crops do not take into account biological and ecological plant protection products from pests and diseases. Such studies are now actively conducted and implemented in all advanced and developed countries of the world, and their implementation is fully consistent with the tasks of transfer and adaptation of technologies and improving the environmental friendliness of agricultural products set by the President of the Republic of Kazakhstan N.A. Nazarbayev in his annual message to the people in 2018.

According to these tasks, on the acreage of «Bayserke Agro» LLP in Almaty oblast, scientific research is being actively carried out as a part of the project of the Ministry of Agriculture of the Republic of Kazakhstan BR 06249249. «Development of an integrated system to increase productivity and improve the breeding qualities of farm animals, on the example of «Bayserke Agro» LLP» under the subproject 2. «Improving the technology of cultivation and harvesting of forage crops». In order to improve the agrotechnology of the cultivation of fodder crops, it is proposed to use the subseed plant - siderat lacy phacelia to them (*Phacelia tanacetifolia* Benth., 1834), belonging to the borage- or forget-me-not family (Boraginaceae) (according to another botanical system, to the Hydrophyllaceae family of the order Boraginales). It is an insect plant. Inflorescence is spike-shaped curl. Flowers are small, pinkish-blue. Perianth are rigidly pubescent. The fruit is a multi-seeded box. Seeds are oval. The mass of 1000 seeds is 1,7-1,8 g.

This green manure is of great interest for several advantages. It unpretentious, it is grown in a variety of conditions, on poor sandy and stony soils. Lacy phacelia enriches the soil with nitrogen and potassium, besides being a good soil disintegrant, improves its aeration, retains moisture and prevents wind erosion. It is rich in phytoncides. When released into the soil, these components have a disinfecting effect and provide prevention of fungal diseases. If this plant is used as a siderate, it will retain moisture inside the soil, while at the same time protecting the roots from rotting and inhibiting the reproduction of pathogenic nematodes and weeds. Lacy phacelia has a deterring effect on some pests (aphids, leafworm, locusts). As a good honey plant, it serves as a powerful attracting factor for entomophages and pollinators, and makes it possible to more effectively use their useful properties in the fields of forage crops [1, 2]. Another advantage of lacy phacelia is that it is not related to any of the studied feed crops (soybean, alfalfa, barley, wheat), and has no pests and diseases in common with them. The green mass of this siderat is used fresh and for ensiling, but it is better mixed with other plants, mainly legumes. The fodder mixture with *Phacelia tanacetifolia* can be used to feed cows, sheep, goats, rabbits, pigs, poultry. Green mass of 8-15 t/ha yield. Mowing the feed must be completed before flowering begins. With the beginning of flowering plants, the feed value of the green mass is greatly reduced. By this time, the dry matter content in the green mass reaches 20 %, its accumulation stops. Because of the beneficial properties of lacy phacelia, intensive research is being conducted worldwide [3-8].

Lacy phacelia, like other cultures are affected by various diseases, many of which are transmitted through seeds. At the same time, pathogenic microflora in the seeds causes their molding, decay, reduces germination energy and germination, and also serves as a source of diseases during the growing season. Sick plants, in turn, are more damaged by pests, for example, true bags, which are abundant on the crops of fodder crops of «Bayserke Agro» LLP [9-11]. Considering that the use of *Phacelia tanacetifolia* seeds is of great importance for their quality, prior phytoexamination is necessary. It will allow the correct selection of a disinfectant against the complex of pathogenic and saprophytic microflora [12].

For phytoexamination and health improvement of seeds, certain studies were conducted by employees of the Kazakh Research Institute of Plant Protection and Quarantine [13-20]. However, for some cultures against the complex of fungal and bacterial infections, protective-stimulating compositions have not been developed.

A phytoexamination of seeds of forage crops (wheat, barley, alfalfa and soybeans), which we carried out earlier in the framework of the same project, showed a high population of pathogenic microflora, which creates a dangerous infectious background for the manifestation of diseases - root rot, *Fusarium*, *Alternaria* and bacterioses, as well as mold and seed rotting. According to the degree of seed contamination, selection of highly effective fungicides with a wide range of fungicidal and bactericidal properties is required. As a result of the studies, a wide range of treaters, biological products, growth regulators, insecticides, and insecticides have been tested, a number of compositional compositions have been developed for wheat and barley. Research continues to develop compositional compositions for alfalfa and soybean [13-20]. Since the seeding of siderate of *Phacelia tanacetifolia* was planned as a part of the research and production research carried out during the project, it was necessary to carry out a phytoexamination of its seeds before sowing and recommend measures for their recovery. This is due to the relevance of the research.

Material and methods. Seeds of *Phacelia tanacetifolia* were purchased by «Bayserke Agro» LLP as a part of the project of the Ministry of Agriculture of the Republic of Kazakhstan BR 06249249 «Development of an integrated system for increasing productivity and improving the pedigree qualities of farm animals, using the example of «Bayserke Agro» LLP in Almaty through «Green Garden» LLP. Producer is Green Carpet LLC, Moscow, Russian Federation.

During phytoexamination of lacy phacelia seeds, submitted from «Bayserke-Agro» LLP to the grain crops protection department of the LLP "Zh. Zhiembayev Kazakh SRI of Plant Protection and Quarantine named", their sowing qualities were evaluated (germination energy for 3 days, laboratory germination - for 7 days) according to GOST 10250-80. The sowing qualities of seeds were determined in wet chambers in plastic containers and on a humid sand dish in Petri dishes. From each sample, 100 seeds were taken in the 4th multiple. The number of diseased seeds and seedlings was taken into account. When phytopathological analyzes of seeds, the species composition of fungal and bacterial microflora established. Analyzes carried out on a nutrient medium - potato (CA), in accordance with the methodological guidelines of N.A.

Naumovoy "Analysis of seeds for fungal and bacterial infection" [14]. The determination of fungal and bacterial microflora was carried out according to the morphological features of the colonies of fungi and bacteria, and their pure cultures. The morphological features of the fungi were investigated by microscopic examination through sporulation.

Research results. The results of laboratory analyzes of phytoexpertise on assessing the sowing qualities of seeds of *Phacelia tanacetifolia* (germination and laboratory germination), as well as the identification of diseased seeds and seedlings in humid chambers and on humid sand are presented in table 1 and figures 1–8.

Table 1 – Sowing qualities of *Phacelia tanacetifolia* seeds, seedling growth rate and their population by mushroom microflora (humid chamber, humid sand)

Repetition	Germination, %	Laboratory germination, %	Growth intensity of sprouts on the 7th day, %			The number of diseased seeds and seedlings, %
			+	++	+++	
Humid chamber (plastic containers)						
I	64,0	64,0	14,0	71,0	15,0	12,0
II	70,0	74,0	17,0	69,0	14,0	13,0
III	66,0	74,0	21,0	70,0	9,0	18,0
IV	72,0	77,0	14,0	73,0	13,0	27,0
The average	**68,0**	**72,2**	**16,5**	**70,7**	**12,8**	**17,5**
Humid sand (in Petri dishes)						
I	40,0	50,0	–	–	–	15,0
II	39,0	50,0	–	–	–	18,0
III	38,0	57,0	–	–	–	14,0
IV	39,0	46,0	–	–	–	11,0
The average	**39,0**	**50,75**	–	–	–	**14,5**
+ - weak growth; ++ - medium height; +++ - intensive growth.						

The results of phytoexamination of the sowing qualities of seeds of *Phacelia tanacetifolia* showed low germination energy, which averaged 68.0 % and low laboratory germination on average 72.2 %. With another experience of moistened sand, these indicators were slightly lower, germination energy was 39.0 %; laboratory germination comprised 50.75 %.

The results of phytopathological analyzes of seeds of *Phacelia tanacetifolia* on a nutrient medium potato-glucose agar (CAA) revealed the dominant fungal and bacterial microflora. The total seed contamination is 100 %. Fungi from the genera *Alternaria* and *Fusarium* predominate from the fungal microflora, causing *Alternaria*, *Fusarium* and root rot. Saprophytic fungi of the genera *Mucor* and *Penicillium* were found, causing mold growth of seeds (figures 3-5). The results of phytoexamination showed that bacterial microfluor prevails in the seeds of the phycameral lacy phacelia (figures 6, 8). Based on the morphological features of the bacterial colonies on the nutrient medium and pathogenic properties, they are assigned to the genera *Pseudomonas* and *Erwinia*.

Discussion of research results. The results of phytoexamination showed that the seeds of *Phacelia tanacetifolia* showed low germination energy, low laboratory germination in a humid chamber and humid sand. These rates may lower in the field as well.

The pathogenic seed microflora creates an infectious background for the molding of seeds, it will reduce the germination energy and seed germination, damage of plants with root rot, *Fusarium*, *Alternaria* and bacteriosis.

In order to heal the seeds of *Phacelia tanacetifolia*, it is necessary to treat the seeds with drugs that have fungicidal and bactericidal properties, in combination with a stimulant that activates physiological processes in plants.

Figure 1 – Laboratory germination of seeds *Phacelia tanacetifolia* in a humid chamber

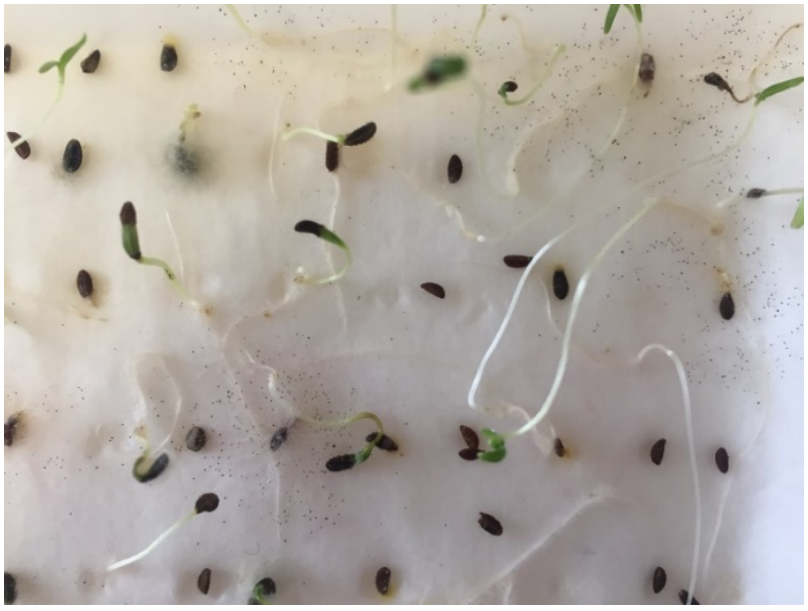


Figure 2 – Affection of seeds of *Phacelia tanacetifolia* by the complex of phytopathogenic fungi

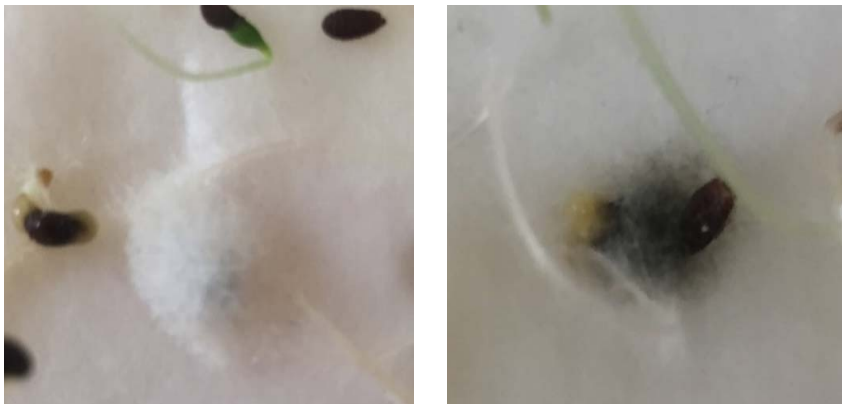
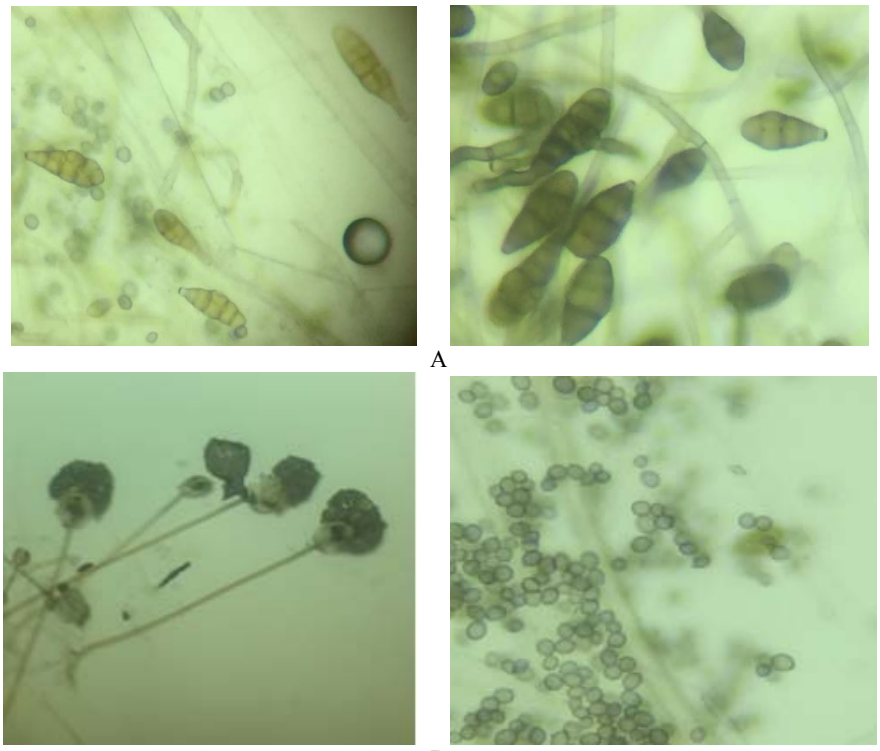


Figure 3 – Damage of seeds of *Phacelia tanacetifolia* by fungi of the genus *Fusarium* spp. and *Alternaria* spp.

Figure 4 – Damage seeds of *Phacelia tanacetifolia* by the fungi of the genus *Mucor* spp.



A

B

Figure 5 – The dominant fungal microflora isolated from seeds of *Phacelia tanacetifolia*:
A – *Alternaria* spp. (conidia); B – *Mucor* spp. (sporangium with disputes)

Figure 6 – Damage of seeds of *Phacelia tanacetifolia* by bacteria

Figure 7 – Affection of seeds of *Phacelia tanacetifolia* by the complex of phytopathogenic fungi (on humid sand)

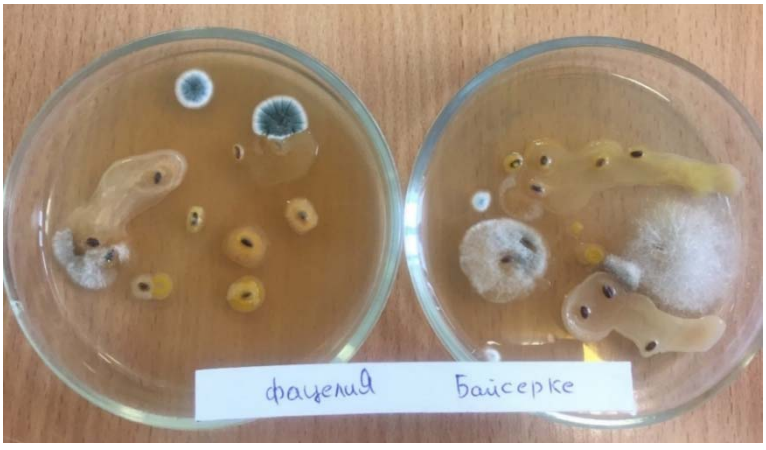


Figure 8 – Damage to the seeds of *Phacelia tanacetifolia* with fungal microflora and bacterial complex

Findings. As a result of phytoexamination of the seeds of *Phacelia tanacetifolia*, their low germination energy and low laboratory germination both on the humid chamber and on the humid sand have been established.

In the phytopathological analysis a complex of fungal and bacterial microflora was revealed. The dominant fungal microflora is represented by representatives of the genera *Alternaria, Fusarium, Mucor* and *Penicillium*; bacteria from the genera *Pseudomonas* and *Erwinia*.

Based on the results of phytoexamination against the complex of the fungal and bacterial infection, a protective-stimulating composition has been selected and the recommendation has been given to the workers of the manufacturing sector of «Bayserke-Agro» LLP (Almaty region) for the improvement of *Phacelia tanacetifolia* seeds by the PMTD scrubber with bactericidal and fungicidal properties - 8.0 l/t, in combination with a biological stimulator Extrasol on the basis of the bacterium *Bacillus subtilis* – 2.0 l/t.

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ПИЖМАЖАПЫРАҚТЫ ТҮЙМЕШЕТЕН СИДЕРАТЫ ӨСІМДІКТЕРІ ТҰҚЫМДАРЫНЫҢ САПАСЫН БАҒАЛАУ (*PHACELIA TANACETIFOLIA* BENTH., 1834) «БАЙСЕРКЕ-АГРО» ЖШС

Аннотация. Пижмажапырақты фацелия *Phacelia tanacetifolia* өсімдік-сидератының тұқымына жүргізілген фитосараптаманың нәтижесінде оның себінділік қасиеттері анықталды. Ылғалды орта тәжірибесінде өсу энергиясы орташа есеппен алғанда 68,0 %, зертханалық өнгіштігі 72,2 %, ауруға шалдыққан тұқымның саны 27,0 %-ға жетті. Ылғалды құм тәжірибесінде бұл көрсеткіштер айтарлықтай төмен болды: тұқымның өсу энергиясы 39,0 %, зертханалық өнгіштігі 50,75 %, ал ауруға шалдыққан тұқымның саны 14,5 %-ды құрады. Бөлінген микрофлорадан саңырауқұлақтардан *Mucor*, *Penicillium*, *Alternaria* және *Fusarium* туыстары, ал бактериялардан *Pseudomona*s және *Erwinia* туыстарына жататын бактериялар бөлінді. Бөлінген микрофлора тұқымның зеңденуіне, өсімдіктердің тамыр шіріктеріне, вегетация кезеңінде фузариоз, альтернариоз және бактериоз ауруларының қозуына инфекциялық фон тудырады, сонымен қатар, тұқымның себінділік қасиеттерін нашарлатады, өсімдіктің өнімділігін айтарлықтай төмендетеді. Жүргізілген фитосараптаманың негізінде ауру қоздыратын саңырауқұлақ және бактериялар кешеніне қарсы қорғаныш-ынталандыру құрамы таңдалып алынды және «Байсерке-Агро» ЖШС-нің (Алматы облысы) өндірістік секторының жұмысшыларына пижмажапырақты фацелия тұқымын сауықтыру мақсатында тұқымды ТМТД с.с.к. препаратымен қоса *Bacillus subtilis* бактериясы негізінде жасалған Экстрасол өсу үдеткішін қосып дәрілеу ұсыныстары берілді.

Түйін сөздер: Фитосараптама, тұқым, сидерат, пижмажапырақты фацелия, *Phacelia tanacetifolia,* «Байсерке-Агро» ЖШС, Алматы облысы, Қазақстан.

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АНАЛИЗ КАЧЕСТВА СЕМЯН РАСТЕНИЯ-СИДЕРАТА ФАЦЕЛИИ ПИЖМОЛИСТНОЙ (*PHACELIA TANACETIFOLIA* BENTH., 1834) ТОО «БАЙСЕРКЕ-АГРО» С ПОМОЩЬЮ ФИТОЭКСПЕРТИЗЫ

Аннотация. По результатам проведенной фитоэкспертизы семян растения-сидерата фацелии пижмолистной *Phacelia tanacetifolia* Benth., 1834 были установлены их посевные качества. Энергия прорастания при экспериментах во влажной камере составила в среднем 68,0 %, лабораторная всхожесть в среднем 72,2 %, процент больных семян - 27,0 %. При экспериментах на увлажнённом песке эти показатели были несколько ниже: энергия прорастания - 39,0 %, лабораторная всхожесть - 50,75 %, количество больных

семян - 14,5 %. Выявленная грибная микрофлора была представлена видами из родов *Mucor*, *Penicillium*, *Alternaria* и *Fusarium*, бактериальная - представителями родов *Pseudomona*s и *Erwinia*. Выявленная микрофлора создает инфекционный фон для плесневения семян, поражения растений корневыми гнилями, фузариозами, альтернариозами и бактериозами в период вегетации, а также ухудшает посевные качества семян, снижает энергию прорастания растений и, тем самым, существенно снизит продуктивность растений. На основании результатов проведенной фитоэкспертизы против комплекса грибной и бактериальной инфекции подобран защитно-стимулирующий состав и дана рекомендация работникам производственного сектора ТОО «Байсерке-Агро» (Алматинская область) по оздоровлению семян фацелии пижмолистной протравителем ТМТД в.с.к., совместно со стимулятором – биологическим препаратом Экстрасол на основе бактерии *Bacillus subtilis*.

Ключевые слова: фитоэкспертиза, семена, сидерат, фацелия пижмолистная, *Phacelia tanacetifolia,* ТОО «Байсерке-Агро», Алматинская область, Казахстан.

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