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OASIS SOILS OF UZBEKISTAN

Abstract: In the article materials on comparative analysis of different characteristics of natural and irrigated soils are given. A fertility of soils is related to its forming processes and changes according to soil evolution and development.

Keywords: soil type, automorphic, hydromorphic, serozem soils, oasis soils, salinity, carbonates, humus.

Introduction

Among agricultural sectors, irrigated agriculture has ancient history and originated in Egypt, China, and Central Asia few thousand years ago. Theoretical deep analysis and reasoning of the issues of the change of natural soils under irrigated agriculture, evolution and formation of the fertility began at the end of the nineteenth century.

Changes of natural soils under the influence of irrigated agriculture occur in three main areas:

1) under the effect of irrigation water soil wetting increases which lead to development of elyuvial processes;

2) transport of a variety of solid and dissolved substances in irrigation water results formation of new agroirrigation horizon;

3) accumulation biologically active elements in the soil and increase of biological activity under the influence of the cultivation of crops and the effects of various agricultural technical activities.

As a result, in dry and very dry regions of Central Asia, from natural soils of this region completely different new cultural oasis soils will form. Formation, development, evolution, fertility problems of oasis soil have a great importance in soil science. Because, rationale the theoretical aspects of these issues, and the effective use of irrigated soils without damage to the environmen is very important.

Object and methods of the research. Tashkent and Samarkand oases were selected as the main object of the detailed studies, which has quite different natural conditions and age of anthropogenic soil formation. Currently, these oases are major regions of irrigated agriculture in the Republic.

In addition, in order to reveal the regularities of oasis soil formation, refinement of nomenclature and classification of irrigated soils, route studies of the soils of other oases of the republic, including Ferghana, Bukhara, Khorezm and others were conducted.

The methods of field, laboratory and cameral study of soils were used, including:

– comparative-geographical, genetic, comparative-historical methods of soil investigation;

– compilation of soil maps of different scale (M: 1: 10000, M: 1: 25000; M: 1: 100000, etc.);

– long-term studies of the productive capacity of soils in key areas and in lysimeters;

– study of morphological features, chemical, physical and other properties of soils in field and laboratory conditions.

Results of the research. In oases of Central Asia, including in Uzbekistan, in contrast to the natural soils under the effect of irrigation will create a new oasis soils. If in the humid countries (such as in the black soil zone), irrigation is only supplement to natural rainfall, in Uzbekistan the water supplied to the plant is higher more than a few times in comparison to average annual precipitation. The main difference according to A. A. Rode [8; 9] that several humidification of the soil and lower layers of the soil during the growing season. Our observations on serozem soils of Tashkent and Samarkand oases shows that soil, as a result of irrigation especially of excessive irrigation soil layer will not only moisten, but water completely washes soil and under soil layers reaches to the groundwater; therefore, there is unique elementary soil forming process.

In addition, if the climate of the oases is a little different from the climate of surrounding natural landscape, microclimate of vegetation fields significantly different from them. The humidity, the temperature of the earth and above height of 2 meters has 25–35% difference.

Central Asia, including Uzbekistan rivers' water is characterized by turbidity in different level. The reason of the turbidity is transport and erosion of small particles in stream and river formation areas. For example, in the mountainous part Zarafshan River transfers 500–1000 tons of small particles from the 1 km2. The chemical composition of these particles associated with the river basin soils and varies throughout the year in the different parts of the river. These particles under the influence of irrigation water flow are transported to the fields. According to V. A. Molodtsov [4], R. K. Kuziyev [3], 22.6–40.0% of solid particles remain in irrigated ditch not reaching to fields. The rest bring 10,8–17,9 tons of solid particles to fields. This is 0,8–1,3 mm thick layer on the ground. Thus, in 250–300 years 30 cm of new layer can be appear. The quality of the new layer depends on the quality of irrigated layers.

Human tries to change lands according to the activities related to it. One of the most common elements of farming on irrigated lands, in the absence of fertilizers these particles extracted and laid to the grounds as fertilizer. As mentioned in S. K. Kondratev (1916), 280 tons of solid particles applied for one hectare from irrigated ditch. These activities drastically change the process of formation and development of soil in oases.

Thus, many ages of irrigated agriculture old has affected for the creation of oasis soils in Central Asia, including oasis soils of our Republic, which is different from natural soil. At the same time, it is obvious that these soils are originated from natural soils which found before irrigated agriculture began. Irrigated soils' formation, structure, properties, intensity of the evolution and productivity issues have been studied by many researchers such as, M. A. Orlov, 1937; A. N. Rozanov, 1946; S. N. Ryjov, 1958; B. A. Gorbunov, 1965; N. V. Kimberg, 1974; R. K. Kuziyev, 1991; 1994; 2011; 2014; R. K. Kuziyev and N.Yu.Abduraxmonov, 2015.

Oasis soils are formed under the influence of human activities, and level to a certain extent natural soil formation process in various conditions. Among soil scientists first M. A. Orlov mentioned this [6], and recommended the term "irrigated cultural" soil. Later, this work is implemented to land distribution and classification by Uzbek soil scientists B. V. Gorbunov, N. V. Kimberg, S. A. Shuvalov, S. P. Suchkov. On the basis of these works these soils differentiated from serozem soils zone which occupies foothills planes of the desert zone, the differences are reasoned. However, the irrigated soils are not differentiated as an independent soil type.

The independent soil type – is a large group of soils, and it develops in same climate, biological, lithological, hydro-geological conditions and soil formation process is characterized by a vivid manifestation.

Integrity and properties of soil type are determined by the following: uniformity of transport of organic residues in the soil and processes of their decomposition and humus formation; uniformity of decomposition of mineral mass and a synthesis of new complexes organic-mineral compounds; same type of migration (movement) and accumulation (store) of substances; same type of soil profile structure and character of a genetic horizons; same direction of measures aimed at improving and conserving of fertility of the soil.

A comparative description of the specifics of different characteristics and properties of natural and irrigated soils shows that the soil forming processes are significantly different in these soils.

First of all, it should be noted that in dry and very dry regions during the irrigation of lands several times a lot of moisture falls to soil compared to atmospheric precipitation. As a result, as the above mentioned, new

type of soil-water regime – irrigation water regime type will occur. The main difference of this is humidification of soil top layers, in some cases to groundwater level a lot of times, during the growing season.

Change of humidification regime in soils in the irrigation process accelerates eluvial processes. As a result, automorphic soil of oases, which in secondary salinity not occur, for example, in serozem-oasis soils amount of chloride and sulphate salts of calcium, magnesium and sodium are reduce.

The soils of Tashkent and Samarqand oases are not salinized by water-soluble salts and has almost no significant effect on the fertility of the soil. In typical serozem soil zones, water-soluble salts in soil profile are completely washed away during the first vegetation period. In the early period of irrigation, water-soluble salts washed to the lower horizontal and then as this process continues and salts are removed from the soils [1]. A small amount of water-soluble salts can be observed at a depth of 3–5 meters of typical serozem soils. Water-soluble salts, including gypsum accumulation can be observed in some cases at a depth of 2 meter, but the amount is not much.

The level of distribution of carbonates in soil profile changes sharply in the irrigation process. During the start of the process of irrigation a specific amount of carbonates and their typical distribution in the profile of natural soils in irrigated light, typical and dark serozem soils remain for a few years. But, especially in the serozem-oasis soils, this process is completely changed, carbonate profile only specific to this subtype is occur (Table 1). Serozem-oasis soils formed from agroirrigation transport substances, the amount of carbonates will be considerably less. In addition, the role of carbonates in the profile also have a big difference from natural soils [2; 10].

Table 1. – Content and composition of serozem-oasis soil, in%

Layer	Layer depth, cm	Carbonates			Layer	Layer depth, cm	Carbonates		
		CO_2	Ca	Mg			CO_2	Ca	Mg
Serozem-oasis soils					**Irrigated serozem soils**				
60–84	0–10	5.89	5.1	0.36	130–85	0–10	9.8	7.0	0.30
	10–30	5.98	5.2	0.48		10–29	10.26	7.4	0.18
	30–40	6.55	5.8	0.36		29–43	10.18	8.1	0.24
	40–58	7.21	6.3	0.48		43–60	11.18	8.1	0.36
	58–100	8.05	7.3	0.36		60–85	11.18	8.1	0.36
	100–125	7.43	6.4	0.48		85–115	11.12	7.9	0.42
	125–170	7.65	7.0	0.48		115–150	10.80	7.7	0.48
	170–200	8.27	7.4	0.48		150–200	10.15	7.4	0.36
	200–250	9.76	7.8	0.48		200–250	10.26	7.3	0.36

In natural serozem soils, as researchers have pointed out many times, the amount of humus is not high. But in some of the horizons the amount of humus is lower. For example, in grass layers of typical serozems, humus content can be 4.0 percent. In dark serozem soils this can be 5,0–6,0%. As we reflect about humus of natural soils, we should note that, firstly, the amount of humus increases from light to dark serozem soils. Second, the amount of humus declines sharply from grass layers to under. Beginning from the second meter, the amount of humus, in many cases, is close to the amount of humus in the parent rock-lyoss, consists 0,10–0,20%.

In particular, during formation of serozem-oasis soils, formation of humus, its distribution in the profile differs sharply from the reserve soils and new humus formation process will occur. During the process of irrigation, soil humus reserve increases. When compared reserves of humus in soils formed in different regions, the amount of humus, first of all, association with the conditions of soil formation (in automorphic or hydromorphic) is observed clearly (Figure 1).

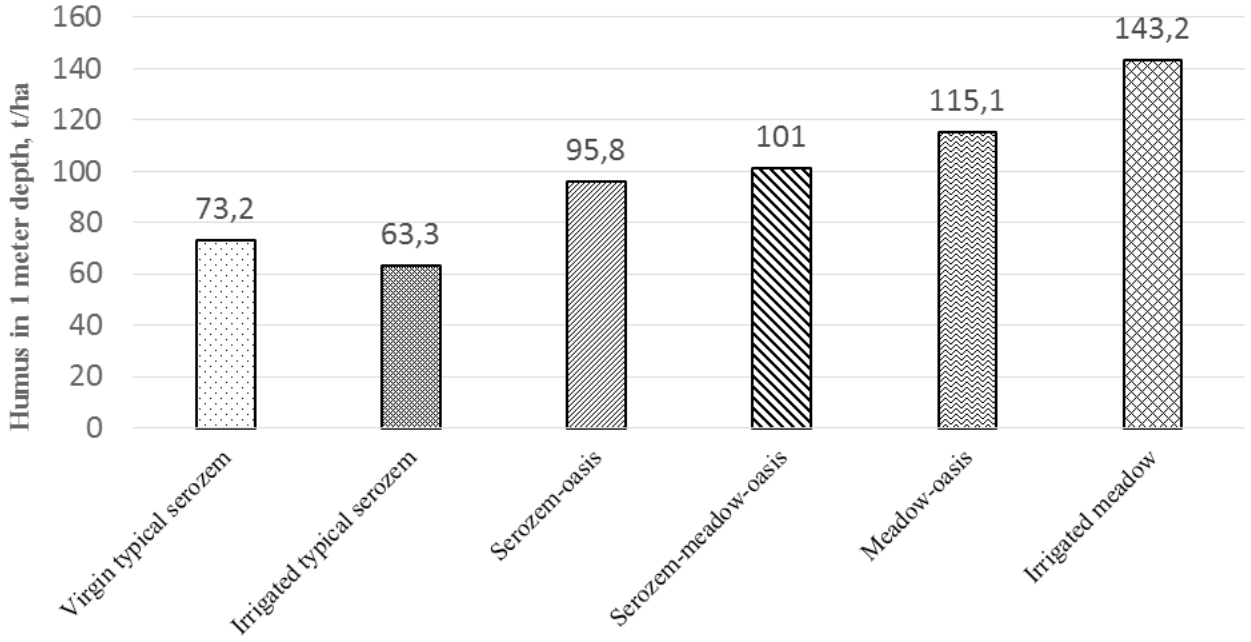

Figure 2. Dependence of the reserve of soil humus to irrigation period

The soil forming process in oases is characterized by specific transport of organic substances to soil, decomposition and synthesis of humus-complex organic substance. In the process of development and irrigation of the soils, plant cover character and the formation of and humus significantly change. The biological productivity of oasis-serozem soils is higher compared to reserve serozem soils. For example, in the cotton fields, biomass of plants on the land can be 10–15 per hectare, biomass of roots 25 tonnes. This is followed by decomposition of them, the formation of a certain level of soil fertility. Of course, the humus consumption significantly increases because of the irrigation process. As a result, the process of formation of humus is more active in irrigated soils. The humus formation process, in oasis soils compared to natural soils is characterized by different in terms of the quality and quantity of biomass and its mineralization. This in turn is reflected in the formation of humus profiles.

When compared the amount of humus in oasis automorphic and hydromorphic soils, in hydromorphic conditions more active humus accumulation process is observed. The calculation of humus reserve in soil profile allow to discover some general laws. In serozem-oasis automorphic soils during early irrigation, depletion of humus reserves, then the increase of them can be observed. In particular, reserves of soil humus in oasis soils significantly higher than the natural soil. In hydromorphic oasis soils in the process of irrigation the soil humus reserves are decreased and their amount stabilized in meadow-oasis soils. Thus, the process of oasis soil formation makes closer each other conditions specific to independent natural soil types.

Conclusion

1. Oasis of Uzbekistan is one of the few regions of the Earth where, as a result of irrigation, powerful anthropogenic soils have formed that have blocked natural soil formations in newly created cultural landscapes. At the same time, the culturally anthropogenic process superimposed on the natural processes of soil formation does not lead to an absolute leveling of the latter, as a result of which series of special soil types are formed in the oases: serozem – oasis, meadow – oasis, desert – oasis and others.

2. In serozem – oasis soils, migration processes of readily soluble salts, gypsum and carbonates are intensified. In a complex process of oasis soil formation, two opposite phenomena of carbonate migration collide: their biological accumulation and illuviation. The latter prevails. This is most clearly expressed in serozem-oasis soils, where the difference in carbonate content between soil horizons and subsoil is 5–7%. In irrigated serozem, the difference in carbonate content is about 3%. With a high content of carbonates, this decrease is hardly notice-

able, but plays a certain negative role in the fertility of oasis soils, since the most active, mobile calcium compounds are carried out first.

3. The humus content of irrigated soils does not have a correlative dependence on the original soils and is established at a new level determined by the zonal position and the level of the crop irrigation culture. In the process of oasis soil formation, the level of humus in all types of irrigated soils is, to a certain degree, leveled and approaches the average for this zone.

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CHANGE OF PROPERTIES OF SALTED SOILS UNDER INFLUENCE OF DETONATION WAVE AND RINSE

Abstract: Irrigation of irrigated saline soils in Central Fergana on checks after processing by installing a gas-dynamic ripper to a depth of 150 cm, width 4 × 200 mm, a norm of 4 thousand m^3/ha, desalination of soil soils was achieved to the level recommended for agricultural use.

Keywords: salted soils, gas-dynamic ripper, washing, water-soluble salts, non-toxic, toxic salts, salinization, desalination.

Relevance. To form the properties of saline soils, including medium and highly saline soils, the presence of two processes is necessary, the formation of free water-soluble salts in the soil profile and their accumulation. It is known that the main source of salts – it rocks and minerals, which are destroyed during weathering. In this case, salts are formed: chlorides, sulfates, nitrates, nitrites, hydrogen carbonates, carbonates, silicates, phosphates and others. The cationic composition of water-soluble salts is dominated by calcium, magnesium, potassium, and sodium. These salts under the influence of surface irrigation and groundwater in the soil profile migrate until they are removed from the soil-ground strata of the irrigated massif.

Groundwater irrigated lands of Central Fergana (Uzbekistan) mineralized, pressure hoses, which are directly involved in the formation of meadow saline soils above named array. Moreover, these soils are gypsies and poorly permeable, starting from the sub-plow horizon. The destruction of these horizons in order to improve water permeability and soil washing under these conditions is an actual problem.

Methods of conducting the experiment. In the process of carrying out the research, the profile method of V. Dokuchaev was used, where the soils were studied from the surface to the full depth, successively along the genetic horizons to the parent rock.

A method of soil-regime observations was used in combination with the methodology of field and vegetation experiments [1]. The experiments were carried out in a four-fold repetition in one tier on the territory of the farm of the Kushtepa district.

Field experiments were conducted in 2015–2017 on irrigated meadow-soils strongly saline soils. The variants of the experiment are as follows:

1. Soil washing without treatment with a gas-dynamic ripper (GDR);

2. one-row cultivation of soils by installation of GDR + washing;

3. two-row soil treatment with GDR installation + washing;

4. three-row cultivation of soils by installation of GDR + washing.

Each variant contains 8 rows of cotton with a length of 100 m. The width between the rows is 90 cm. When cultivating cotton after flushing, the usual agricultural techniques adopted in the farm were used. Processing, i. e. Soil

rupture was carried out by installing the GDR by impacting the soil with air shock volleys without mechanical contact with the working organs. The working organs of the GDR are paired pipes, which have a cylindrical turbulizer and a combustion chamber common to each pair of pipes [2]. The opening ends of the pipes are directed towards the treated soils and equipped with silencers.

Soil cultivation was carried out by a hinged aggregate for the T-28 cultivator in the following mode: the distance from the detonation pipe cut to the soil surface is 30–50 mm, the width of the grip is 200 mm. Therefore, single-row treatment, for example, option 2, means 200 mm of soil treatment, 150 cm deep. Two-row cultivation of soil with a width of 400 mm, a depth of 150 cm, etc. up to the fifth option. Soil processing by the specified parameters is made in the middle of the variant from the beginning to the end. After processing and initial lying of the experiment in the fall of 2015, checks were made in each variant separately for the purpose of conducting washing irrigation. Analyzes were carried out according to [3].

Description of the results. Irrigated saline soils when used in agriculture, arable farming exhibit unfavorable properties. These include a slightly alkaline reaction of the soil solution, toxicity of ions and salts, unsatisfactory water-physical characteristics, weak biological activity, transformation of colloids, alkalinity and others. In such conditions, the efficiency of farming decreases, which cause the growth and development of cotton, thus inhibiting the supply of nutrients in them.

As shown, route field and expeditionary research by laying the supporting sections on the investigated areas of the field experiment, a high summer-autumn temperature, a close level of ground mineralized waters. These provisions determined the development of gley-eluvial and gley processes, combined with saline soils and the formation of saline irrigated meadow soils. Reserves and distribution of salts in the investigated stratum are comparatively uniform and slow growth from top to bottom along the profile is observed. As for the mechanical composition, the content of physical clay along the profile fluctuates in the range of 34.2–60.11%. The density of the soil varies, from 1.24 to 1.43 g/cm^3, on average, is 1.34 g/cm$^{3.}$

Maximum hygroscopicity and soil moisture to the bottom increases. Porosity varies from 46 to 52%. The lowest moisture capacity is 25–30% of the weight. The content of humus and nitrogen decreases from top to bottom, and phosphorus is reversed, which is related to the parent rock. But it should be emphasized that the content of total phosphorus in the plow horizon is higher than in the rest, which is due to its annual application to cotton. The distribution of carbonates is uneven, its content in the central part of the profile increases, and the pH of the medium is slightly alkaline.

According to the generally accepted classification, leaching waters are fresh, hydro carbonate-chloride-sulfate. The norms of washing irrigation taking into account the initial salinity of the soils are calculated according to the formula of Volobuyev [4] and submitted in two doses of 2 thousand m^3/ha, totaling 4 thousand m^3/ha. Flushing irrigation was carried out in late December, early January. The results are given below. With regard to the quality and quantity of water-soluble salts calculated by Bazilevich [5] before and after washing are shown in the table.

Table 1. – Changes in the salt composition of soils,%

Options	Section number	Depth, cm	Na_2CO_3	$Ca(HCO_3)_2$	$CaSO_4$	$MgSO_4$	Na_2SO_4	NaCl	Amount		
									Non-toxic	Toxic	Total
The initial content of salts is 2015, autumn.											
1, ground water, g/l	1	0–32	No	0.106	0.669	0.704	0.469	0.232	0.775	1.405	2.180
		32–51	No	0.088	0.776	0.806	0.340	0.249	0.864	1.395	2.259
		51–90	No	0.090	0.758	1.118	0.300	0.222	0.848	1.640	2.488
		90–110	No	0.093	0.806	1.039	0.223	0.183	0.899	1.445	2.344
		111–130	No	0.072	0.959	1.043	0.237	0.148	1.031	1.428	2.459
		130–180	Traces	0.106	0.795	1.172	0.294	0.112	0.901	1.583	2.484
		180–200	0.001	0.093	0.772	1.193	0.795	0.095	0.865	1.583	2.448
		> 200	0.003	0.279	2.315	2.568	2.328	0.289	2.594	5.185	7.779

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
After carrying out the washing irrigation, 2017, winter.											
4, ground water, g/l	4	0–32	No	0.028	0.198	0.123	0.007	0.018	0.226	0.148	0.374
		32–51	No	0.028	0.176	0.129	0.008	0.018	0.204	0.153	0.357
		51–90	No	0.029	0.169	0.129	0.075	0.020	0.198	0.224	0.422
		90–110	No	0.030	0.171	0.133	0.073	0.020	0.201	0.226	0.427
		111–130	No	0.030	0.173	0.134	0.065	0.036	0.203	0.235	0.438
		130–180	0.009	0.107	0.191	0.153	0.153	0.030	0.298	0.345	0.643
		180–200	0.016	0.610	0.507	0.530	0.513	0.107	0.617	1.657	2.274
		> 200	0.032	0.180	1.500	1.650	2.020	0.315	1.680	3.017	4.697

Prior to the washing of the soil, the experimental plot was represented by highly saline meadow irrigated soils, where the total amount of salts varies between 2.180–2.489. The distribution is almost uniform, with a maximum in the 51–90 cm layer. In the initial state, the content of Na_2SO_4 and NaCl, $MgSO_4$ in the soil is relatively high, which is typical for saline soils in Central Fergana, the content of toxic salts ranged from 1.405 to 1.640% in accordance with the uniform distribution of salts there is also their stock.

As a result of soil washing with a rate of 4 thousand m^3/ha in deep horizons, a small increase in the concentration of soda in the range 0.009–0.016% is observed, before washing, it was very low in the form of traces due to its content in groundwater and physicochemical processes that occur during washing in the lower soil layers.

With regard to hydro carbonates, sulphates, chlorides, their content after washing with the norms of 4 thousand m^3/ha there is a significant reduction in their content. As a result, the amount of toxic salts, if prior to washing, ranged in the range of 1.395–1.640%, after washing, 0.148–0.345% became. Similar changes occurred in the content of non-toxic salts and dense residue, that is, the amount of salts.

Before washing salts in an average two-meter layer contained 2.380%, then after washing was 0.443%, that is, the salt content decreased by 5.4 times. As can be seen from the content of the amount of salts, including the toxic discrepancy in desalination of soils between the options after washing large. According to the content of sulfate and chloride salts in the two-meter layer of soil, the change is significant in favor of the fourth variant, where four-lane loosening was carried out to a depth of 150 cm, a width of 200 mm, and a GDR installation.

From the foregoing, it can be concluded that in the chloride-sulfate type of salinization, washing with conventional hydro carbonate-calcium-magnesium waters on the variants treated by the GDR plant resulted in desalination of irrigated highly saline meadow soils to low and medium salinized, sulphate soils, where sulfate salinity permits the content of a dense residue in saline soils in the range of 0.3–0.5%.

The results of the study showed that the fourth option was the most effective option in terms of economics and the removal of water-soluble salts from soil horizons, where four-row soil cultivation was carried out by a gas-dynamic ripper before washing irrigation.

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APPLICATION OF GEOINFORMATION SYSTEM TECHNOLOGIES IN STUDYING SOIL PROPERTIES

Abstract: The article describes application of geographic information systems for soil properties studying. According to the results, using GIS technologies in soil studies is easy and optimistic way to analyze soil properties. Therefore, application of GIS systems will improve land resources management, land use planning, soil fertility improvement and soil protection.

Keywords: soil, land resources, soil properties, soil fertility, geographic information system, soil map, digital soil mapping, spatial interpolation.

Introduction

Obtaining reliable information on agricultural lands, efficient and rational use of them, predetermining negative anthropogenic factors require the development of measures based on scientific research. To do this, the use of new methods in soil mapping, especially, when integrated soil research is limited, the use of new geo-information technologies will bring the industry to a new level and will achieve high productivity. In addition, the use of these technologies will shorten the time required for the initial (preliminary) and final (cameral) stages of soil mapping, the speed of work, the upgrade and processing capabilities of the database will increase.

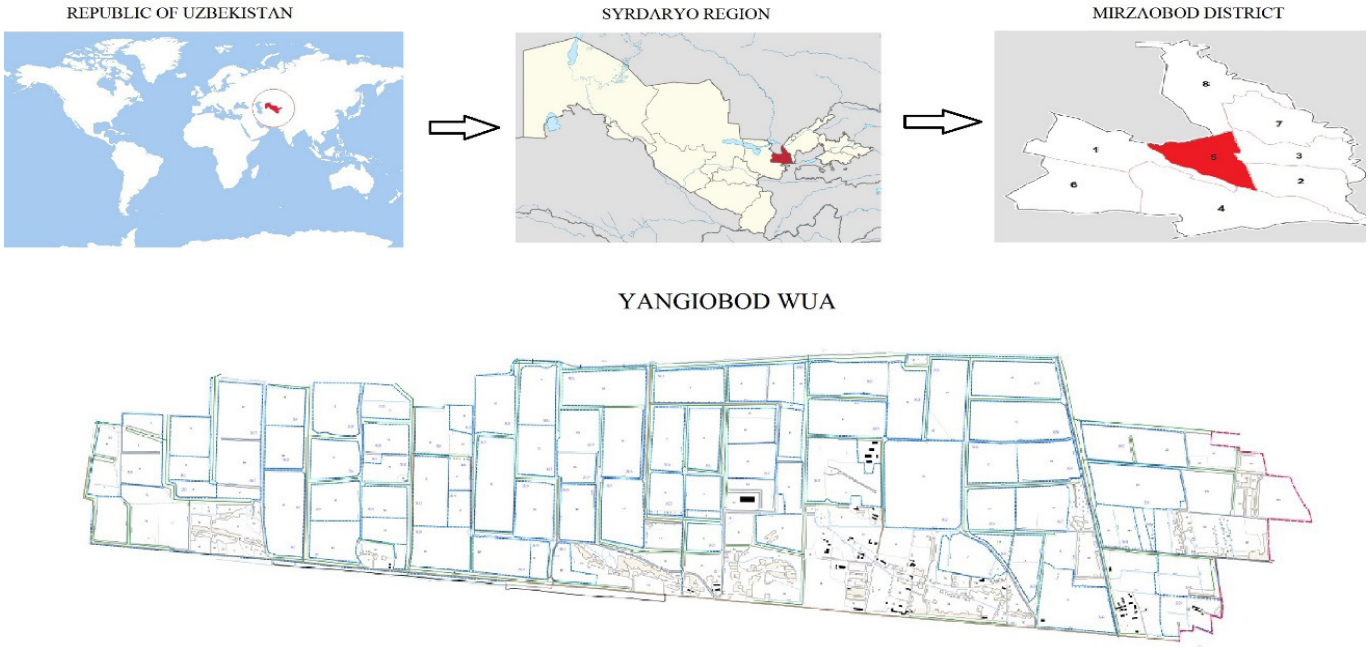

Figure 1. Map of the research object's location

In our republic, too, the application of geoinformation systems in agriculture promotes effective and rational management of land resources. This technology links geographic information with data from traditional soil mapping works. The use of geographic information in this field creates abilities on the basis of modern computer programs and devices analyzing the entire range of information about a specific subject or object and solving problems in a certain area, as well as developing a geoinformation system of soil fertility and soil fertility models, predicting the adverse effects of negative factors on soils.

The research objects and methods

As of the object of the research was chosen Yangiobod in Mirzaobod district of Syrdarya region.

The methods of research was based on commonly accepted methods, comparative-geographical, laboratory-analytical, statistical analysis of data and geospatial analysis based on geographical information systems, mathematical processing of data.

Initially field-soil research was carried out on the sites of this research object. In the field, primary and secondary soil sites were laid, soil samples were taken for chemical analysis. During the soil survey, the coordinates of each soil site were determined by using GPS devices to determine the geographical location of the soil samples.

For creating soil fertility maps based on geo information systems several indicators (humus, gypsum, CO_2, N-NO_3, P_2O_5, K_2O, dry residue, NCO_3, Cl and SO_4 compounds) were selected. These indicators were selected based on their role in determining the basic properties of the soils and geoinformational analysis was carried out using the Geostatistical Analyst (GA) module of ArcGIS. The coordinates of the geographical location of the main soil sites were determined and the values of the chemical results of the soil samples were entered. The spatial distribution of soil properties on the experimental field has been determined. For this purpose, methods of interpolation in the Geostatistical Analyst (GA) module of ArcGIS were used.

The research results

Humus and nutritional status of soils

The productivity and fertility of irrigated soils depends largely on the availability of humus and nutritional content. The role of humus in the formation of processes, changes and properties in the soil is very important. Organic matter in the soil is capable of collecting and maintaining a large amount of nutrients and moisture due to the excessive absorbency and capacity of water.

The humus content in topsoil of the studied irrigated soils is within range of 0.57% to 1.20%. P_2O_5 (phosphorus) substances have a mean range of 2.67 mg/kg to 31.20 mg/kg. K_2O (potassium) substances in the topsoil of the studied soils varies from 20 mg/kg to 268 mg/kg.

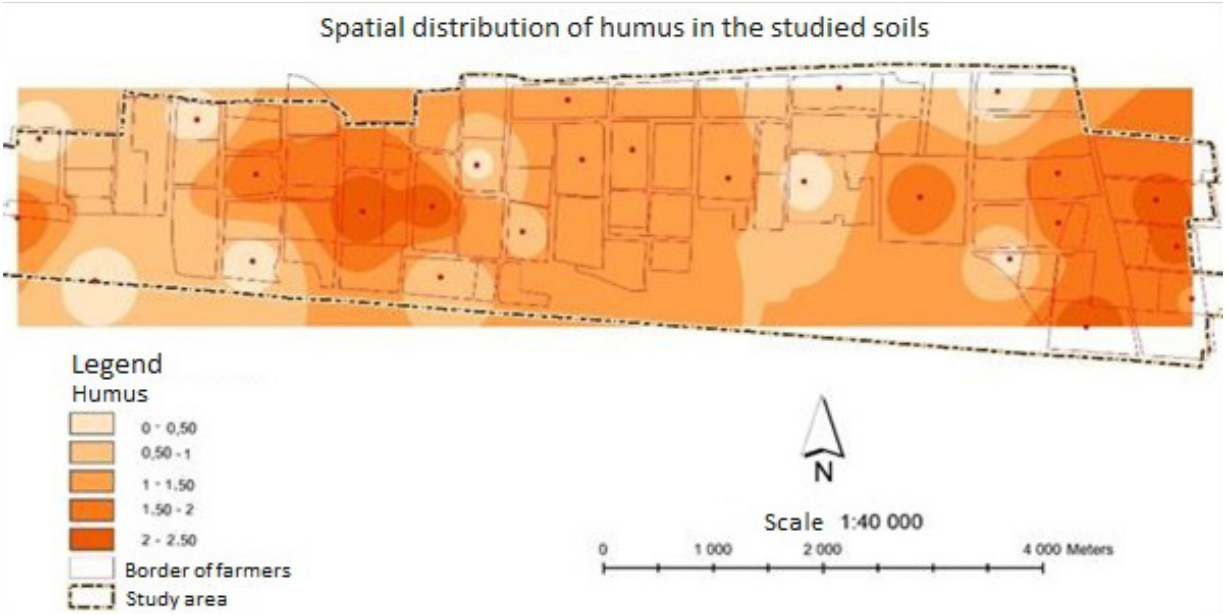

Figure 2. Map of humus distribution on irrigated soils of Yangiobod in Mirzabad district of Syrdarya region

Soil salinity, types and degree of soil salinity

Salinity is one of the main soil processes determining the fertility and ecological and reclamation status of irrigated lands, which depends on relief, geomorphologic-lithological structure, hydrogeological and human-economic conditions of the region, technical condition of hydromeliorative systems and a number of other factors.

According to the results of the research, the irrigated soils of Yangiobod in Mirzaabad district of Syrdarya region are mostly medium, strong and very strong saline, with a total amount of water-soluble salts in the soil profile forming a wide range of 0.275–4.895%. The amount of HCO_3 content is 0.021–0.043%, the content of chlorine ion is 0.021–0.843% and the sulfate ion fluctuates at 0.117–2.402%. According to salinity chemistry, the main soil sites consist of chloride-sulfate and sulphate saline types.

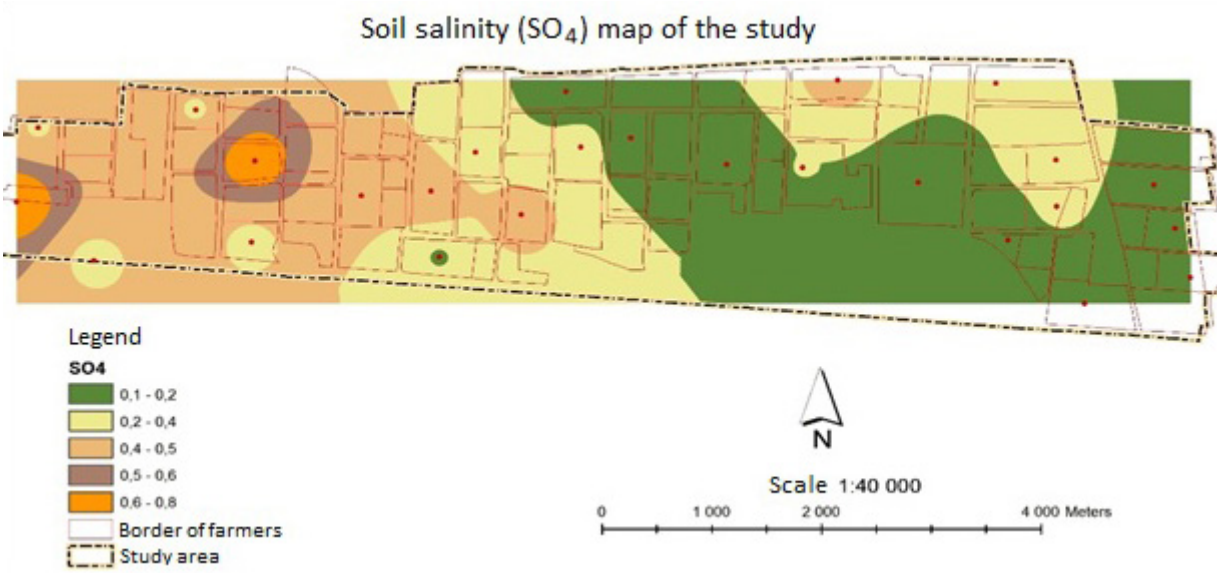

Figure 3. Salinity (sulfur) map of irrigated soils of Yangiobod in Mirzabad district of Syrdarya region

The general evaluation map of the soil

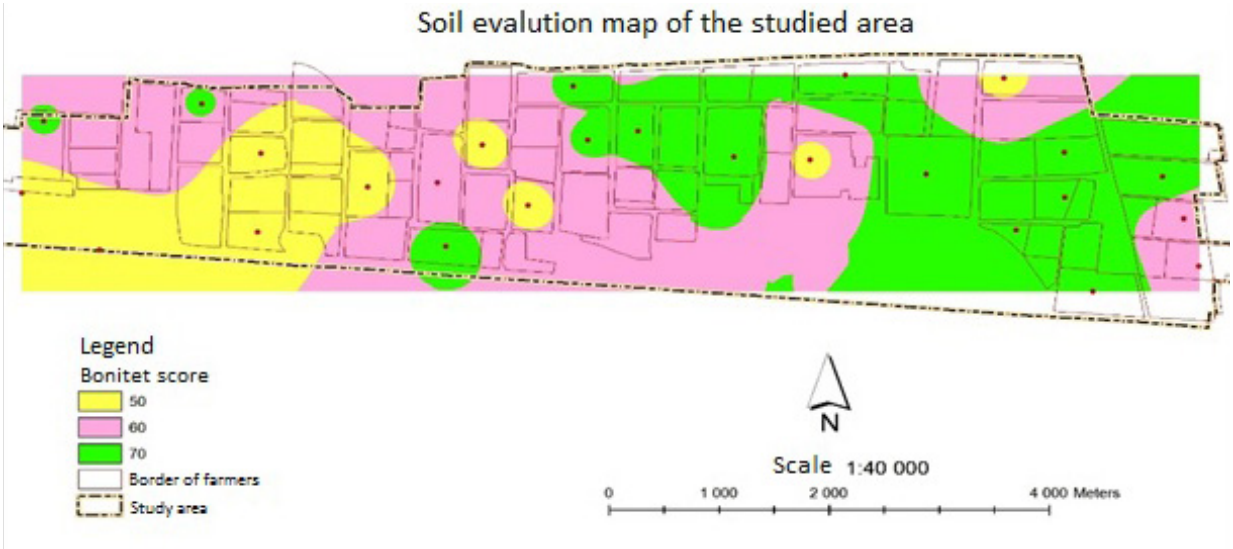

Figure 4. General evaluation map of irrigated soils of Yangiobod of Mirzabad district of Syrdarya region

After determining key characteristics of the soil on the experimental area, according to the aforementioned indicators, at the next stage interconnected spatial analysis was performed by using several indicators, ie, the interaction of soil properties in the determination of soil fertility was studied using geostatistical analysis in ArcGIS software. Geostatistical Analyst's model gave opportunity to determine the fertility of the soil, to select the specific indicators that characterizes their fertility and to determine the bonitet score of the experimental site.

Conclusion

As a result of the research, it was found that ArcGIS software modules Spatial Analyst and Geostatistical Analyst will provide broader opportunities for researchers to analyze the results of soil research and to create special thematic maps. In addition, geographic information system used for conducting soil surveys showed great opportunities to analyze the data provided by multiple methods simultaneously, to monitor soil status based on the data collected over the years, to make the data available to consumers at any size and in the electronic copy, also many other similar options.

Also, maps derived from GIS technologies provide accurate and up-to-date information on the soil condition of the area, its fertility level. This, in turn, provides an opportunity to determine the availability of land resources for agriculture, to monitor land degradation, to plan agricultural lands, to analyze soil conservation measures.

In conclusion, it should be noted that the use of modern geoinformation technologies in the field of soil science can provide accurate and timely information, increase possibilities for their operational processing and storage, as well as a database of soil properties will be created, resulting in a creating possibility to thorough analysis of the condition of land resources.

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CORRECTION OF PHYSICAL-BIOCHEMICAL PROCESSES IN THE ORGANISM BY FLAVOSAN

Abstract: Flavosan leads to a decrease in oxygen consumption, calcium transport, the formation of reactive oxygen species, the hydrolytic activity of phospholipase A_2, but the indicators that determine the effectiveness of oxidative phosphorylation are almost unchanged. These changes reduce the consumption of oxygen in the body, do not cause drowsiness and do not lead to death. Hence, flavosan increasing the "bilayer" areas in membranes that increase stability translates the organism from the active metabolic state into a passive state.

Keywords: rat, mouse, flavosan, oxygen, heart, brain, liver, mitochondria, oxidative phosphorylation, calcium, reactive oxygen species, phospholipase A2.

Introduction

Flavonoids are medicinal food substances that ensure the normal functioning of organs and tissues of the body and possess different clinical and pharmaceutical properties. Currently, flavonoids are widely used in the prevention and treatment of widespread diseases of the cardiovascular system, the mayor of cerebral circulation, neurodegenerative processes, cancer [1; 2; 3; 4; 5], hepatic pathologies [6; 7; 8; 9; 10; 11] and many other diseases.

A number of works have been published on the connection of the structure of flavonoids with their antioxidant activity [12; 13; 14; 15; 16; 17; 18; 19], only in isolated works these relationships were quantitative. According to these studies, the antioxidant activity depended on the number and position of hydroxyl groups in flavonoid molecules, the presence of two hydroxyl groups in the ortho position in the benzene ring.

Many living organisms cannot perform their vital functions – metabolic functions that require energy, generate energy-rich substrates, in other words, assimilation and dissimilation reactions to maintain homeostasis, without the consumption of oxygen [20; 21; 22]. Each gram of food involved in the process of cellular metabolism under aerobic conditions gives approximately 20 times more energy than in an anaerobic condition [23]. Because, the amount of energy released during the oxidation of nutrients is several times higher than the energy released during the oxidation of pyruvic acid in widespread fermentation or glycolysis.This ratio, i. e. "Oxygen/water (+ 0.82 V) and pyruvic acid/lactic acid (– 0.19 V)" is determined by the difference between conjugation of oxidation-reduction potential [24]. If we take into account that the main substrates of respiration and fermentation potential is slightly greater than or equal to – 0.7 V, the maximum difference in the oxidation-reduction potential of respiration is 0.7 V + 0.82 V= = 1.52, and for fermentation is 0.7 A – 0.19 C = 0.51 V.

Oxidative phosphorylation in the mitochondrial system is considered one of the main factors determining the energy state of adenine nucleotides in the cell. Mitochondria in addition to the production of ATP,

directly involved in the regulation of the concentration of free Ca_2 + in the cell cytoplasm [25; 26; 27; 28; 29; 30].

Mitochondria take calcium at low speed and store, but in volume far exceeds the endo- and sarcoplasmic reticulum and directly participates in the regulation of free calcium in the cytoplasm. In a calm state of the cell, the mitochondria are also in a steady state and the calcium content around them is lower (10–7-10–8 M), because the proximity of free calcium is significantly lower than the calcium transport system of mitochondria (10–5-10–3 M). However, with an increase in the calcium content in the cytoplasm (especially in the areas between the mitochondria and the endoplasmic reticulum), a high content of free calcium makes it possible to accumulate calcium in the mitochondrial matrix (10–3-10–2M).

Under such conditions, an increase in the calcium content in the mitochondrial matrix affects the mitochondrial states, in particular, stimulates an increase in ATP production [31]. However, the further accumulation of calcium ions in the mitochondrial matrix leads to the generation of oxygen radicals and an increase in the hydrolytic activity of endogenous phospholipases, the discovery of nonspecific pores in the mitochondrial membrane, the rupture of the outer membrane and, as a result, the loss of mitochondrial function [32; 33; 34].

Various cellular organelles contain many enzymes that catalyze the reduction of oxygen to H_2O_2 (substrate-oxygen-oxidoreductase). For example, back in the 70s of the last century it was known that 30% of the hydrogen peroxide formed in the liver appears due to mitochondria. It was found that in intact mitochondria (external, internal membranes and matrix), there are several enzymes that produce H_2O_2 and their activity is associated with tissues. For any tissue, the common and most active "enzymes" is the respiratory chain. The rate of production of H_2O_2 in intact mitochondria depends on their functional state and (V 3or V 4 states) on the nature of the oxidation substrates (NAD^+ – dependent substrates and succinate).

Submithochondrial particles (preparations from connected intramitochondrial membranes) have the ability to produce hydrogen peroxide with the participation of NADH or succinate. The immediate precursor of hydrogen peroxide, which is produced in the respiratory chain, is the superoxide radical ($O_2 \bullet$) [35]. One of the products of lipid peroxidation is malonicdialdehyde.

The flavonoid preparation (luteolin, chrysoeriol, apigenin, cinaroside, formonononetin) isolated from thermopsis (*Thermopsis alterniflora*, legumes – Fabaceae) has very low toxicity [36]. At oral administration of flavosan into the body of an animal at a dose of 5000 mg/kg, no adverse effect was observed [37]. Flavosan markedly increases the endurance of animals under hypoxic conditions [38]. The antihypoxic property of flavosan is explained by the careful consumption of oxygen in conditions of hypoxia [38].

Proceeding from this, it is important to consider the study of the effect of flavosan on oxygen consumption, mitochondrial respiration, oxidative phosphorylation, and calcium transport, formation of free radicals and hydrolytic activity of phospholipases.

Detection of the effect of flavosan on oxygen consumption and body temperature, oxidative phosphorination, accumulation of calcium and the formation of reactive oxygen species and the hydrolytic activity of phospholipase A2 was the goal of our study.

Materials and methods

In experimental studies, white male rats weighing an average of 180–200 g and white laboratory mice weighing 30–35 grams were used. The food and water of rats and mice were obtained without restriction. Experimental animals were divided into 6 groups: the first group was control, and the remaining groups orally received different doses of flavosan (the second – 100 mg/kg, the third – 200 mg/kg, the fourth – 300 mg/kg, the fifth – 400 mg/kg and sixth – 500 mg/kg).

To determine the respiration of small animals, the oxygen content in the canister in which the animal was mixed was determined by the method of polarography [39]. A separate chamber was prepared according to the magnitude of each animal to determine the oxygen consumption by the animals. This equipment has an outgoing tube connected to the micropump. For this purpose, an improved micropump used in aquariums was used. The advantage of the equipment lies in the fact that in addition to measuring the content of oxygen absorbed through the pump, you can determine the time by the minute. For example, if an animal consumed 40 ml of oxygen per minute, multiplying this figure by 60 minutes, you can get that the consumed oxygen content is equal to 2400 ml. After this, the value obtained is divided by the mass of the animal. For example, if rats with a body

weight of 200 g were used for the experiment, here from one kilogram it will be 5 times less. Correspondingly, the value obtained above, i. E. 2400 ml oxygen/hour is multiplied by 5 and as a result we get 12000 ml oxygen/kg. This value can be expressed in mole oxygen/hour. And this requires additional calculations. It is known that 1 mole of oxygen occupies 22.4 volumes. 1 liter of oxygen corresponds to 45 mM. Now the value obtained above, i. e. 12000 ml oxygen/kg per hour convert mM, we get 266 mM oxygen/kg hour. Determining the rate of oxygen consumption by the whole organism is exactly this.

Lipid peroxidation process in mitochondria was determined by micromethod developed by Yu. A. Vladimirov and A. I. Archakov.

All experiments were conducted in strict compliance with the principles of the Ethics Committee on animal experiments.

Mitochondria of their heart, brain and liver of rats were isolated using the differential centrifugation method of Hogeboom O. N. et al., [1948] with some modifications [40].

Lipid peroxidation process in mitochondria was determined by micromethod developed by Yu. A. Vladimirov and A. I. Archakov. 20 μM FeS04 + 0.2 ascorbate was added to the mitochondria and the lipid peroxidation was measured after 20 min. Accumulation of malonic dialdehyde was determined at 532 nm. The measurement medium consisted of KCl – 115 mM, NaH2PO4–1 mM, Tris-HCl-5 mM (pH 7.4). The rate of the reaction of lipid peroxidation was expressed in nm malondialdehyde/mg min.

Hydrolysis of phosphatidylethanolamine under the influence of endogenous phospholipase A2 in mitochondria was determined by the formation of lysophosphatidylethanolamines in an incubation medium containing 0.25 M sucrose, 10 mM Tris-HCl, pH 9.5 for an hour at 37 °C [41]. The hydrolytic activity of phospholipase A2 was expressed in μg/hr mg.

Calcium transport through the mitochondrial membranes is determined by the pH-metric method, based on the exchange of $2H/Ca^{2+}$ in mitochondria. The medium used to accumulate calcium was 120 mM tris-HCl, 10 mM Tris-HCl, 5 mM succinate, pH 7.4, rotenone (1 mkg/ml) and 1 mM phosphate, pH 7.4.

To determine the effect of flavosanan respiration and oxidative phosphorylation of the mitochondria, 500 mg flavosan was introduced per 1 kg of body weight and after 20 minutes the mitochondria were isolated from the tissues of the heart, liver and brain, their changes in respiration and oxidative phosphorylation were revealed. The mitochondrial respiration and phosphorylation parameters were determined by the method of Chance B., Williams G. L. [42]. The following rates of respiration rate were determined: V2 – oxidation state of the oxidation substrate; V3 is the active phosphorylated state after the addition of ADP, V4 is the state after the consumption of ADP in the cell. Respiratory index according to Chance (V3/V4 ratio) and the ratio of ADP/O during oxidation of various substrates (10 mM succinate or glutamate). The rate of respiration in all metabolic states of the mitochondria was expressed in nanograms atom/min per mg of protein. The protein content in the mitochondria was determined by the method [43].

Flavosan was isolated from thermopsis (Thermopsis alterniflora, legumes – Fabaceae) in the Institute of Chemistry of Plant Substances of the Academy of Sciences of the Republic of Uzbekistan.

Results and discussion

The change in oxygen consumption (as the value of the standard exchange) and body temperature after administration of a different concentration of flavosan in the body of rats and mice is shown in Table 1.

From the data obtained it was revealed that under the influence of flavosan the standard exchange and body temperature decreased and this process increased with increasing concentration of flavosan. It was found that a decrease in the standard exchange is slightly faster than a decrease in body temperature. If the standard exchange was measured after 60 min of administration of flavosan at concentrations of 100, 200, 300 and 500 mg/kg, it decreased by 22.2, 29.5, 38.5 and 44.4%, respectively. The same changes were observed in mice. At the same time, the standard exchange decreased by 22.8, 30.1, 41.2 and 47.3%. Hence, flavosan, depending on the reduction of heart rate, minute volume of blood and oxygen capacity of blood, significantly reduces the transport of oxygen into the body. But these changes do not affect the state of sleep and do not lead to the death of animals. It transfers from an active metabolic state to a passive metabolic state. From this it becomes evident that the influence of flavosan at the organism level reduces energy consumption, i. e. transfers oxygen to a system of economic consumption.

Table 1. – Influence of flavosan on oxygen consumption in animals (M ± m; n = 6–8)

Flavosan, mg/kg	Rat		Mouse	
	Oxygen consumption, мМ O_2/min			
0	1369.2 ± 136.8	100	3895.8 ± 608.9	100
100	1037.8 ± 129.5*	75.8	3007.5 ± 578.4	77.2
200	965.3 ± 118.2***	70.5	2723.1 ± 565.6*	69.9
300	842.0 ± 109.9****	61.5	2290.7 ± 440.8**	58.8
500	761.3 ± 102.3****	55.6	2053.1 ± 378.5***	52.7

Note: here and in other tables S.E.M.:$^{*}P < 0,05$; $^{**}P < 0,02$; $^{***}P < 0,01$; $^{****}P < 0,001$.

The stability of warm-blooded organisms to hypothermia and their recovery after prolonged cooling have long been the subject of research [44; 45]. The central issue of hypothermia is the exchange of oxygen in chilled warm-blooded organisms. Until now, scientists have not come to a common opinion on the significance and order of the influence of various factors, leading to changes in the oxygen-oxygen metabolism of organisms in different stages of hypothermia. Until now, the question of the effect of reducing oxygen consumption in the system of its transport in the body on the metabolic processes in the body remains open and whether it is the result of various changes in the system of oxygen transfer in hyperthermia. In our opinion, respiration and oxidative phosphorylation of mitochondria can play a major role in the transition of warm-blooded animals from the active metabolic state to the passive metabolic state.

To confirm this hypothesis, the following changes in respiration and oxidative phosphorylation of mitochondria isolated their heart, liver and brain tissues (Table 2).

Table 2. – Alteration of respiration and oxidative phosphorylation of mitochondria of various organs of rats under the influence of flavosan (M ± m; n = 6–8)

Organs and readings	Respiration rate, Nano gram atom ofO_2/min/mg of protein			
	Glutamate		Succinate	
	Control	Flavosan	Control	Flavosan
Heart				
V_2	45.6 ± 4.0	29.0 ± 3.2**	214.1 ± 16.4	161.8 ± 7.5***
V_3	161.8 ± 7.6	118.2 ± 5.4**	426.3 ± 23.6	321.0 ± 10.4***
V_4	40.1 ± 4.7	27.9 ± 3.6**	203.6 ± 17.8	143.1 ± 8.6***
V_{DNP}	161.8 ± 9.5	121.8 ± 6.8**	477.3 ± 32.5	385.2 ± 13.8***
RC_{Ch}	4.03 ± 0.23	4.23 ± 0.19	2.09 ± 0.09	2.24 ± 0.08*
ADP/O	2.76 ± 0.12	2.98 ± 0.14	1.75 ± 0.07	1.89 ± 0.07*
Brain				
V_2	13.54 ± 1.36	8.80 ± 1.22**	24.57 ± 2.56	18.55 ± 2.05**
V_3	42.00 ± 3.23	29.64 ± 2.34****	76.12 ± 4.17	47.21 ± 3.46**
V_4	12.70 ± 1.49	8.57 ± 1.31**	23.31 ± 2.89	16.32 ± 2.12*
V_{DNP}	44.41 ± 3.86	31.62 ± 2.39****	77.49 ± 4.46	65.94 ± 2.37*
RC_{Ch}	3.31 ± 0.11	3.46 ± 0.12	3.26 ± 0.09	2.89 ± 0.09*
ADP/O	2.69 ± 0.08	2.84 ± 0.10	1.70 ± 0.07	1.85 ± 0.06*
Liver				
V_2	18.8 ± 2.2	12.7 ± 1.1***	33.0 ± 3.1	25.5 ± 2.2**
V_3	59.9 ± 5.7	43.6 ± 3.8****	97.7 ± 7.5	79.1 ± 4.7***
V_4	19.0 ± 2.5	13.0 ± 1.3***	31.3 ± 3.3	24.5 ± 2.4**
V_{DNP}	61.0 ± 6.4	45.4 ± 4.2***	160.0 ± 9.8	137.9 ± 6.0***
RC_{Ch}	3.15 ± 0.10	3.35 ± 0.12	3.12 ± 0.12	3.23 ± 0.13
ADP/O	2.57 ± 0.09	2.87 ± 0.09	1.72 ± 0.08	1.83 ± 0.09

Flavosan slowed down the oxidation of glutamate in V2, V3, V4 and V_{DNP} states compared to the control at 36.4; 27.0; 30.4 and 24.7%, but changes in the indices determining the efficacy of oxidative phosphorylation-the Chance respiratory rate and the ADP/O ratio-were almost not observed. Precisely the same changes were observed in the oxidation of succinate in various metabolic states. Flavosan reduced the oxidation of succinate in the V2, V3, V4 and V_{DNP} states as compared to the control at 24.4; 24.7; 29.7 and 19.4%, and the Chance coefficient of respiration and the ADP/O coefficient increased slightly.

When flavosan rats are introduced into the body in mitochondria of the liver, the oxidation of glutamate in the states V2, V3, V4 and V_{DNP} is decreased as compared to the control by 22.1; 27.1; 31.6 and 25.5% and succinate by –22.7; 19.0; 21.6 and 13.8%. If the respiration rate for Chance and the ADP/O ratio increased slightly with glutamate, then the succinate did not change much. In the mitochondria of the brain, the oxidation of glutamate in the V2, V3, V4 and V_{DNP} states decreased by 35.0 in comparison with the control; 29.4; 32.5 and 28.8%, and with succinate at 24.5; 18.0; 30.0 and 14.9%. The respiratory rate for Chance and the ADP/O ratio slightly increased.

As the effect of flavosan in the animal body results in an economical consumption of oxygen and a decrease in body temperature, a decrease in the respiration of the mitochondria without affecting the process of oxidative phosphorylation-the Chancerespiration coefficient and the ADP/O ratio and maintaining normal vital activity, i. e. translates the body from one metabolic state to another metabolic state? In our opinion, such changes are achieved by flavosan reduction in the formation of active forms of oxygen. Therefore, the purpose of the following experiments was to study the effect of flavosan on the formation of reactive oxygen species in mitochondria.

After preliminary administration of flavosan to the animals at doses of 100, 200, 300 and 500 mg/kg and mitochondrial release after 20 minutes from the heart, brain and liver, the content of malonaldehyde decreased by 9.3, respectively; 19.8; 28.4 and 44.3%; – 13.6; 34.0; 40.6 and 59.4%; 14.4; 25.1; 36.0 and 54.4% (3 – table).

Table 3. – Alteration of reactive oxygen species formation in mitochondria under the influence of flavosan (M ± м, n = 8–10)

Flavosan, mg/kg	Rate of LPO reaction, nmol, malonicdialdehyde/mg of protein					
	Heart	%	Brain	%	Liver	%
0	0.420 ± 0.057	100	0.288 ± 0.034	100	0.300 ± 0.050	100
100	0.381 ± 0.048	90.7	0.220 ± 0.032*	76.4	0.257 ± 0.042*	85.6
200	0.337 ± 0.045*	80.2	0.192 ± 0.034*	66.0	0.223 ± 0.044**	74.9
300	0.301 ± 0.055**	71.6	0.171.0 ± 0.032***	59.4	0.192 ± 0.038***	64.0
500	0.234 ± 0.056****	55.7	0.117 ± 0.027****	40.6	0.137 ± 0.039****	45.6

Hence flavosan reduces the formation of active forms of oxygen in the mitochondria of various organs. This process is particularly noticeable in the mitochondria of the brain.

The plasma membrane, mitochondria and endoplasmic reticulum of eukaryotes contain a calcium transport system [47]. Typically, the plasma membrane contains three systems: Ca2 + channels, specific ATPase and $Na^+ – Ca^{2+}$ exchange [48; 49]. If the calcium content in the cytoplasm increases markedly (especially in the region between the mitochondria and the endoplasmic reticulum), a high concentration of calcium ions in the mitochondrial matrix results in the accumulation of a certain amount of calcium (10–3-10–2 M). Under these conditions, calcium accumulated in the mitochondrial matrix leads to increased respiration and ATP synthesis in mitochondria. But a further increase in the concentration of calcium ions in the mitochondrial matrix leads to an increase in the generation of oxygen radicals and the hydrolytic activity of phospholipases, the activation of nonspecific pores in the mitochondrial membrane, the rupture of the outer mitochondrial membrane, and the loss of the synthesizing function of ATP in the mitochondria [50; 51; 52; 53]. Therefore, our next goal was to elucidate the effect of flavosan on the amount of calcium accumulation and the hydrolytic activity of liver phospholipase A2 in liver mitochondria (Table 4).

Table 4. – Alteration of calcium accumulation in liver mitochondria under the influence of flavosan (M ± м, n = 8–10)

Flavosan, mg/kg	Volume of calcium accumulation in mitochondria, nmol/mg of protein		PLA2 activity mkg/hour mg of protein	
Control	87.9 ± 5.8	100	27.2 ± 3.4	100
100	77.8 ± 4.4*	88.5	24.6 ± 2.9	90.4
200	69.5 ± 4.3****	79.0	22.4 ± 2.5	82.6
300	58.9 ± 4.0****	67.0	20.0 ± 2.7**	73.7
500	39.7 ± 3.5****	45.1	16.6 ± 2.9***	60.9

After preliminary administration of flavosan to the animal organism at doses of 100, 200, 300 and 500 mg/kg and mitochondrial release after 20 minutes, a decrease in the calcium-accumulating volume of liver mitochondria was revealed in liver tissue compared to the control animals by 11.5; 20.9; 33.0 and 54.8%. Almost exactly the same changes were observed in the activity of phospholipase A2 mitochondria (decreased by 9.6, 17.4, 26.3 and 39.1%). Hence flavosan leads to a decrease in calcium transport and the activity of the hydrolytic activity of calcium-dependent endogenous phospholipases. As a result, "bilayer" areas increase in the membrane and "monolayer" areas decrease [54]. Phospholipases almost do not work in the «bilayer» areas. From this it follows that by reducing the influx of calcium into the mitochondria, the cell passes into a metabolically active state. At rest, the calcium content around the mitochondria is low (10^{-7} – – 10^{-8} M) and is kept in a calmly steady state, because the calcium content is lower than in the calcium of the mitochondrial transport system (10^{-5} – 10^{-3} M) [55; 56].

Conclusion

From the results obtained, it can be concluded that a decrease in the consumption of flavosan oxygen can be associated with a decrease in the formation of active forms of oxygen, calcium accumulation and phospholipase activity.

Breathing and oxidative phosphorylation of mitochondria of organs and tissues in conditions of invivo determines the oxygen-oxygen exchange of the organism. Heldt (1969) found that the rate of phosphorylation of exogenous ADP is directly proportional to the concentration of endogenous ATP. Hence, the speed of the mitochondria (the speed of the electron and proton fluxes) is determined by the content of adenine nucleotides in the mitochondria – in the control animals above, and in animals that have received flavosan below. In our opinion, the influence of flavosan on the influx of calcium ions, the formation of free radicals and the activity of phospholipases of mitochondria leads to an increase in "bilayer" and a decrease in "monolayer" areas, increases the density and compactness of membranes, and as a result of reducing the transport of substrates to the active center of membrane-dependent enzymes their activity and transport of ions through special channels decreases. At the same time, the influence of endogenous and exogenous toxic substances decreases. From a functional point of view, the channels are more 103–105 compared to Na pump. Therefore, with an insignificant decrease in their density in the membrane, the need for the energy required to maintain the ion concentration gradient in the membrane is sharply reduced. Such processes take place in intracellular organelles. From this it follows that poikilothermic animal to adapt to unfavorable conditions should regulate the number of open channels and the associated metabolic rate. The goal of this strategy is to maintain at the minimum required level of energy, nutrients and various biologically active substances.

Hence flavosan reduces the transfer of calcium, the formation of free radicals and the hydrolytic activity of phospholipases, i. e. leads to an increase in "bilayer" areas in the membrane and an increase in the stability of the membrane. These changes reduce the respiration of mitochondria, the consumption of oxygen and substrates by the body, but they almost do not affect the indices determining the effectiveness of oxidative phosphorylation – the Chance respiratory rate and the ADP/O ratio.

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DETERMINATION OF THE TOTAL AMOUNT OF ANTIOXIDANTS IN SOME MEDICINAL PLANTS IN KASHKADARYA RIVER BASIN

Abstract: In the scientific work, the total amount of antioxidants in the leafs of some medicinal plants growing in Kashkadarya river basin like as in Mentha, Melissa, Trichodesma, Peganium, Origanium, Rheum, Ziziphora, Alhagi, Rumex were defined. On the research general antioxidants are found in Mentha, Melissa, Trichodesma, Peganum, Origanum, Rheum, Ziziphora, Alhagi, Rumex, but the highest amount of the antioxidants was studied in Mentha, Melissa, Origanium.

Keywords: antioxidants, free radicals, Mentha, Melissa, Trichodesma, Peganium, Origanium, Rheum, Ziziphora, Alhagi, Rumex, triton X-100, 96% of alcohol, 0-fenontroline, extract.

Antioxidants are active combinations; these are significant for the organisms of plants and animals. And the antioxidants are important to complete the task of natural detoxication systems to take out the free radicals and radical forms from organisms [1].

Natural antioxidants include ascorbic acids, lemon acids, polyphenols, flavonoids, carotinoids, cysteine, phospholipids, tocopheroles, vitamins A and K.

It is known that fruit vegetables are rich to antioxidants and it is beneficial to eat regularly. Antioxidants are found in the following quantities: black cherries, all kinds of beans, walnuts, almond, forest coconut, pistachio, garlic onion and others [2].

As well as in various fruit trees a large amount of vitamin C, which is also found to be antioxidant in the leaves of walnuts, peach, mulberry, cherry and vine trees were defined, its amount depends on the vegetation period of plans.

Some of them are used as a drip, a liquid extract for the treatment of diseases [2; 4]. Natural antioxidants protect the organism from free radicals and increase the tolerances to various adverse effects and slow down the contamination process. Natural antioxidants can be used to treat many diseases. In the absence of antioxidants in our organism a number of diseases can be aroused [1]. Antioxidant peculiarities in some medicinal plants such as Inula helenium, Glycyrrhiza glabra, Calendula officinalis, Hypericum scabrum, Matricaria recutita and Rumex thyrsiflorus were studied [7].

Determination of the total amount of antioxidants in medicinal plants is important as a biological value. The main purpose of our research is to determine the total antioxidant quantity in the leaves of medicinal plants such as Mentha, Melissa, Trichodesma, Peganum, Origanum, Rheum, Ziziphora, Alhagi, Rumex thyrsiflorus in Upper parts of Kashkadarya river

basin. Research was carried out in the various vegetative periods of the medicinal plants.

In determination of the total antioxidants in the leaves of medicinal plants, a solution of 1% of triton-X-100 in 96% alcohol was used. The method is based on oxidation of antioxidants by iron III – chloride. It is returned from Fe^{+3} to Fe^{+2} chloride, its quantity is determined by intensity of the color generated by the addition of 0-fenontrolin.

The resulted color complex was measured at 505 nm wave length in the spectrophotometer – 46. The results are shown in (table 1).

Table 1. – Amount of general antioxidants

№	The name of plants	Spring	Summer	Autumn
1.	Mentha asiatica	3900 ± 200	10500 ± 150	5850 ± 150
2.	Melissa officinalis	11700 ± 150	2400 ± 150	1800 ± 20
3.	Trichodesma incanum	6300 ± 19	4500 ± 150	
4.	Peganum harmala	7060 ± 450	1800 ± 150	3000 ± 300
5.	Origanum tyttanthum	1575 ± 150	10200 ± 450	3450 ± 150
6.	Rheum turkestanicum	8400 ± 0	1350 ± 150	
7.	Ziziphora pedicellata	8850 ± 195	4200 ± 150	
8.	Alhagi pseudalhagi	4200 ± 300	1537.5 ± 112.5	3600 ± 300
9.	Rumex thyrsiflorus	8100 ± 300	7200 ± 200	1950 ± 150

Our results show that the highest amount of general antioxidants is in Melissa leaves in spring, it is 11700 mkg/g, and such high concentration was found in Mentha and Origanium. It is 1500 mkg/g in Mentha, 10200 mkg/g in Origanum. This indicator is determined at the time of blossoming.

The medicinal Mentha extract contains 3900 mkg/g in spring, 10500 mkg/g in summer, 5850 mkg/g in autumn. There are ether oil, carotene, gesperidin, urosolat, olenat acids in the leaves of medicinal Mentha. Flavonoids have been identified in the leaves.

Mentha preparations are used in medicine for stomach – intestinal pains, abdominal diseases, cholecystits, gallbladder disease and hepatitis. The highest concentration of antioxidants in leaves of Melissa plants is observed in spring, it involves 11700 mkg/g, 2400 mkg/g in summer and 1800 mkg/g in autumn. In traditional medicine, these plants are used for strengthening the nervous system and boosting heart disease, as well as for treatment some diseases.

The highest amount of general antioxidants in Origanum is detected during its blossoming period and its amount gets 10200 mkg/g, 1575 mkg/g in the spring and 33450 mkg/g in the autumn. It was found that the highest concentration of the Origanium is in the spring [5].

According to the facts, the Origanium plant contain 0,6% of ether oils, 1,35% of kumanrin, 11,06% of polyphenols, 3,2% of flavonoids [4; 6]. Medicinal forms of the origanium plant influence as an effect of the appetite, improving of stomach-intestinal tract and pain relief.

Rumex blooms in May-June. Its fruits are ripen in July, grows as a weed, its root is used as raw material, and it contains anthracic syrups, flavonoids, ether oil, resin (pitch), vitamin K, mucous matters and other compounds [1]. In traditional medicine is used as drip, boil, extracts [2; 4].

According to results, it is shown that the highest of general antioxidant was determined in bloomed period of Rumex, it consists of 8100 mkg/g. It was observed that its concentration decreased. It consisted of 7200mkg/g in summer and 1950mkg/g in autumn.

The research results show that general antioxidants are available in the leaves of medical plants like Mentha, Melissa, Trichodesma, Peganum, Origanum, Rheum, Ziziphora, Alhagi and Rumex. Its highest amount is defined in Melissa, Mentha and Origanum.

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A STATISTICAL ANALYZE OF PASTURE PLANTS OF KASHKA-DARYA BASIN FOOTHILLS

Abstract: ecological monitoring indicates the modern condition of the biodiversity in foothills pasture plants. The characteristic spectrum of foothills pasture plants was studied and analyzed on all life forms of the plants. Kashka-Darya basin foothill pasture plants on ecological observations were investigated as critical due to desertification periods.

Keywords: ecology, life form, foothill, climate, Kashka-Darya basin.

1. Introduction

Kashka-Darya basin is one of the parts of Uzbekistan, that its foothills pasture plants are very diverse. To protect of the biodiversity is the main tasks of the environment. An original geomorphologic structure of Kashka-Darya basin, climate, that diversity of natural condition notes the peculiarities of the rich flora, seasonal and zonal distributions. The territory belongs to the temperate climatic zone. The climate is dry continental with long, hot and dry summer season; the winter season is short with mild frosts and little snow. The average annual temperature is 13˚C – 14˚C, the average temperature of January is 0˚C – 2˚C, average temperature of the July is 26˚C – 28˚C, the annual precipitation is 400–600 mm [4].

2. Materials and Methods

Foothill plants with restricted range often grow in stressful conditions due to climate changing and feeding of livestock. Pollution, grazing, farming, recreation exerts extremely negative influence on these populations, and can lead to their reduction or even extinction. Considering these facts, we studied the modern ecological positions of Kashka-Darya basin pasture plants.

Field research was performed during May and June 2017 by traditional phytosociological methods with description of plant associations, collection of herbarium [1]. The main materials of pasture plants of Kashka-Darya basin foothills for statistical analyze are "Flora of Uzbekistan" (Volume I–VI), "Determinant of Central Asian plants" and own sources. The life structure of populations was defined in accordance with T. A. Rabotnov [2] and A. A. Uranov [3].

3. Results and Discussion

According to the received data analyzes of scientific researches and scientific sources, we defined the plants belonging to 73 of family, 323 of genera (genus) and 624 of species in the territory. A large family and genus were located by means of majority of the species. According to the plenty of the species, the first place belongs to Asteraceae, the second place to Poaceae, the third place to Fabaceae families. The majority of the species, belonging to leader families (Poaceae, Asteraceae, Fabaceae) and genera (Astragalus, Artemisia) approaches to flora of Central Asia mountain districts.

The most endemic species are representatives of the following families: Asteraceae, Poaceae, Fabaceae, Chenopodiaceae, Lamiaceae, brassicaceae, Apiaceae, Boraginaceae, Scrophulariaceae, Ranunculaceae. It was used of the simplified variant of I. G. Serebryakov classification to analyze the life forms of plants spreading in Kashka-Darya basin foothills pastures (Table 1).

There are recorded 624 species and life forms are widespread in the following: trees – 13, shrub and dwarf shrubs – 34, semi shrubs –19, semi dwarf shrubs –15, perennials –316, biennials –27, annuals –303 (Table 3). The life forms of trees, principally is belonging to Salicaceae and Rosaceae families, and there are formed brush wood and foothills trees.

Shrub and dwarf shrubs are belonging to 34 of species and 13 of families. The main species are concerning to Polygonaceae, Rosaceae and Fabaceae families. 19 species of semi shrubs are suitable for Chenopodiaceae and Asteraceae families. Originally there are

15 species in foothills and these are semi shrubs, belonging to Chenopodiaceae and Asteraceae families. Genus of Artemisia creates the desert and foothill zone pastures. Artemisia is the edificatory in these areas. Cenopopulation of Artemisia are widespread principally in gypsum and gravel places of sandy deserts and foothills.

Perennial herbaceous plants are 316 species and these plants are related to 54 of families. These species include the family of Poaceae-37, Fabaceae-32, Asteraceae-33, Lamiaceae-23, Apiaceae – 16. Annual plants consist of 240 species and these plants are memberships of 36 families. On the life forms annual species include in the following: Chenopodiaceae-33, Poaceae-28, Asteraceae-27, Brassicaceae-21.

Table 1. – Leader families and genera of plants spreading in Kashka-Darya basin foothill pastures

№	Family	Number		A lot of genus in family	Number of species
		genus	species		
1.	Asteraceae	41	80	Astragalus	22
2.	Poaceae	34	66	Cousinia	11
3.	Fabaceae	16	58	Veronica	10
4.	Chenopodiaceae	19	46	Salsola	10
5.	Lamiaceae	16	36	Artemisia	9
6.	Brassicaceae	22	28	Lappula	8
7.	Apiaceae	16	24	Delphinum	7
8.	Boraginaceae	14	25	Lathyrus	7
9.	Scrophulariaceae	11	23	Bromus	7
10.	Ranunculaceae	6	17	Suaeda	7

4. Conclusions

In general, the density and structure of populations of plants indicate that their state is not satisfactory with the exception of Asteraceae family species. Absence of plants in the foothills and the small composition of the plant representatives indicate critical state of this area that in Kashka-Darya basin on foothills due to desertification.

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IDENTIFICATION OF GLIADIN PROTEINS OF LOCAL AND INTRODUCTORY WINTER WHEAT VARIETIES GROWN IN KHOREZM REGION

Abstract: The article contains information on gliadin proteins and their polymorphism in the grain of 15 winter wheat varieties grown in Khorezm region.

Keywords: Wheat, grain, gliadin proteins, polyacrylamide gel, electrophoresis.

Introduction

Among the proteins in the plant, the reserve proteins which accumulate large amounts in the seeds play important role. Reserve proteins include gliadin and glutenins in grains. Most of the proteins such as wheat, barley, maize, and rye are prolaminee and glutelin. Prolamines in the wheat are called gliadin.

For an ideal research of proteins, it is not only necessary to divide the protein from the plants, but to separate them into fractions. Most proteins are used for their solubility. Different types of proteins in plant tissue are isolated: albumen in water, globulins in the weak solution of salts, prolamines in alcohol and glutamines in alkaline solution [2].

Currently, proteins are widely used not only as markers of genes, but also as the markers of genes at the species level, as well as species of the species and plant varieties population.

Proteins with high polymorphic properties are of great practical interest. This interest is related to the fact that first of all, polymorphic proteins have the potential to be used as markers for genotype identification in genetic-selector research. The genotype identification, which does not require complex laboratory devices, can be realized in a short time with the help of protein markers, provides accurate and scientifically-based cataloging of modern varieties and hybrids, as well as helps control their genetic makeup [1; 3].

Research has shown that gliadins of wheat are coded on the basis of gene clusters, are located on the short side of 1A, 1B, 1D, 6A, 6B and 6D chromosomes [3; 8].

Reserve proteins, gliadin and glyutenin in the wheat grains are exceed 80%. They are called gluten proteins and form insoluble, water-soluble substances. Wheat gliadin is a heterogeneous protein consisting of several groups. Using the modern method sequencing for proteins α, β and γ gliadin, which constitute 80–90% of the total gliadin content, show that, amino acid residues are substantially close. In addition, the fraction of the gliadin differs greatly from the high molecular weight, amino acid composition and physicochemical properties. The φ-fraction is 10–20% of the total fractions (α, β, and γ). The weak charge of the α – gliadin fractions is their main reason for their extremely electrophoretic movement. Increasing the proline in the molecule leads to the slowdown in the action of the components in the fractions. Thus, gliadines are rich in proteins glutamine and prolamine that are closely interconnected in the structure of amino acids, internal molecular s-s, free of sour environment.

Materials and methods

Bushuk and Zilman's "Wheat cultivar identification by gliadin electrophoregrams" [5; 6] method was used for analyzing of wheat gliadin proteins on the polyacrylamide gels and also to study electrophoregramma under method of Woychik "Polymorphism and proteins changing among the species" [7] was used. 15 winter wheat variety samples grown in Khorezm region were used in genetic analysis. Bezostaya-1 was used as a control variety. 100 seed samples were analyzed from each varieties.

Results

In the winter wheat, gliadin etalon spectrum has more than 30 main layers, its structural structure has shown below:

α 01234567, β 12345, γ 12345, φ 123456789101112

Table 1. – The electrophoretic spectrum of gliadin proteins was as follows when the coding of the varieties for four fractions based on laboratory analysis results

Kroshka variety	α 2356	β 12345	γ 1345	φ 13478
Sila variety	α 457	β 2345	γ 1245	φ 3478
Grom variety	α 1356	β 12345	γ 1345	φ 3589
Dustlik variety	α $2_1$3456	β 2345$_1$	γ 234 φ	φ 3578
Krasnodar-99 variety	α 13567	β 1345	γ 1345	φ 578
Yaksart variety	α 02$_1$3457	β 1235	γ 234	φ 35789
Zimnitsa variety	α 356	β 12345	γ 12345	φ 368
Tanya variety	α 1257	β 1234	γ 1234	φ 123489
Asr variety	α 1257	β 1245	γ 1234	φ 1234589
Yonbosh variety	α 3567	β 1234	γ 145	φ 3489
Andijon-2 variety	α 1256	β 1235	γ 1345	φ 34678
Zvezda variety	α 3467	β 12345	γ 1345	φ 2346789
Durdona variety	α 1346	β 1245 23456789	γ 1345	φ23456789
Chillaki variety	α 346	β 2345	γ 1345	φ 4589
Vostorg variety	α 346	β 2345	γ 1234	φ 1234789

Grain crop varieties, which do not contain too much prolamine (about 100 grains) analyzing, will allow them to rely about genetic-homogeny level of these variety populations. The analysis of varieties of wheat and sucrose varieties in our country has revealed that there are numerous biotypes and genetic heterogeneity of the prolamine gene locus is up to 17%.

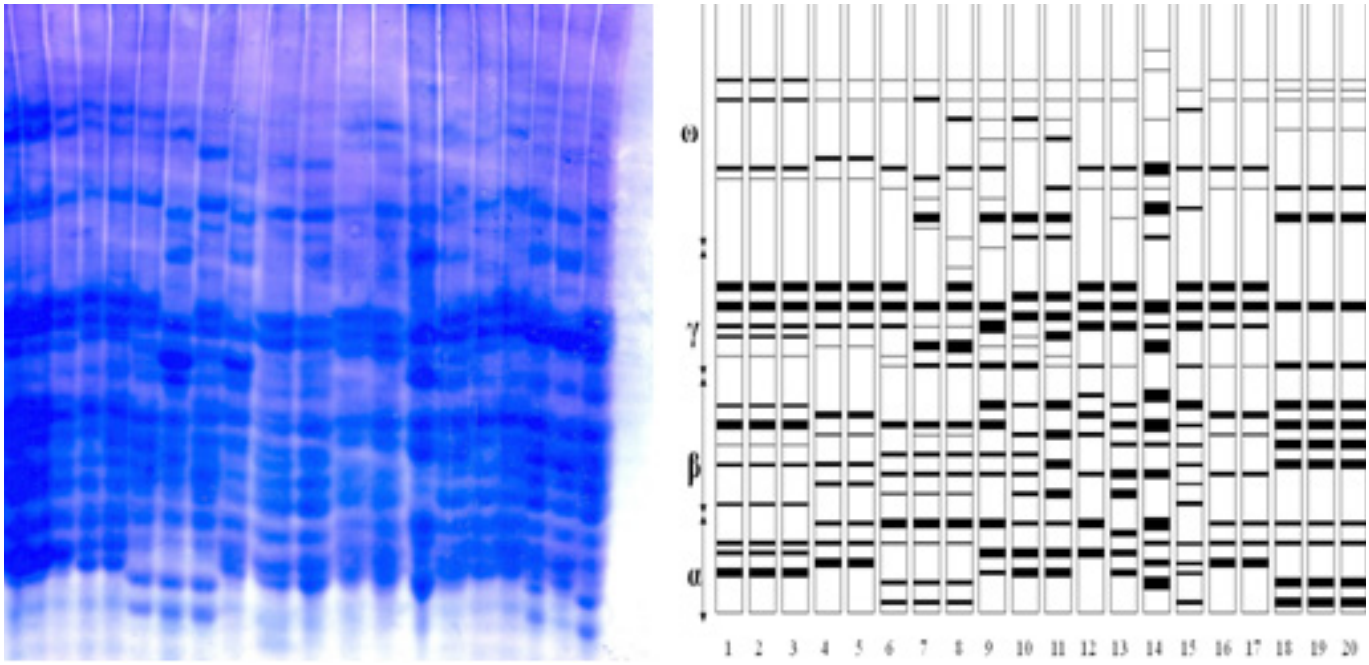

Figure 1. Electrophoregramma and scheme of winter wheat varieties grown in Khorezm region by PAGE electrophoresis (1–3 – Kroshka, 4 – Sila, 5 – Bezostaya – 1, 6 Grom, 7 – Dustlik, 8 – Krasnodar-99, – Yaksart, 10 – Zimnitsa, 11 – Tanya, 12 – Asr, 13 – Yonbosh, 14 – Andijon-2, 15 – Zvezda, 16 – Durdona, 17 – Chillaki, 18–20 – Vostorg)

The electrophoretic analysis of 15 winter wheat varieties grown in the Khorezm region was carried out in the laboratories of the Khorezm Mamun Academy and the Institute of Genetics and Plant Experimental Biology. The

results of the laboratory analysis showed that from 15 varieties of winte wheat varieties grown in the region, "Durdona", "Asr", "Yonbosh", "Chillaki", "Andijon-2" and varieties introduced from foreign countries "Zvezda", "Grom", "Sila" and "Vostorg" were observed internal polymorphism. The presence of internal polymorphism was detected, and "Durdona" four, "Asr" and "Yonbosh" three, "Chillaki" two, "Andijon-2" five and imported varieties "Zvezda" and "Sila" four, "Grom" and "Vostorg" three genetically different biotypes were discovered in the local conditions. It was observed that the Bezostaya-1 control variety electrophoresis of gliadin proteins was one of the simultaneous comparisons of the results by Sozinov and Poperelya [4].

Conclusions

The results of the analysis of winter wheat varieties show that many of them have gliadin varieties of heterogeneity, that is, one species of wheat, reflected by several biotopes, with gliadin coding locus alleles have been found to have variations. In conclusion, the studying of gliadin proteins in the composition of wheat grain with help of electrophoresis method in the polyacrylamide gel allows detecting polymorphism in the variety. Thereby, some different of biotopes are divided in the populations throw this. It is possible to create new resistant varieties of pest, biotic and abiotic stress factors in selection and seed breeding using differentiated gliadin-encoding locus.

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AMINO ACIDS IN SOIL THEIR PROPERTIES AND PROBLEMS

Abstract: The given data on the content of soil amino acids in soils and soil-forming rocks of sierozems and chernozems shows that the relative accumulation or their increased formation varies depending on the type and subtype, the horizon of the soils and the soil-forming rocks. The dependence of the amino acid content in sierozems on their relative height and landscape-geochemical conditions was determined.

Keywords: Dark sierozems, chernozem, bedrock, loess, neogene, oasis, soil fertility, irrigation, free amino acids, humus, landscape, group composition of humus.

Education and the oasis irrigated sierozem during long time have led to the need to recognize them for separate unit as an independent education in elementary and geochemical landscapes. Geochemical parameters which are determined not only natural, but agrogeobiochemical conditions. In arid and semi-arid regions in the supergene zone biogeochemical and biochemical processes occur very rapidly. The geographical position determines their average type climate region of this landscape, in which there is accumulation of elements active migrants in these soils.

Climatic features determine the activity of weathering processes and soil formation. In conditions of high air temperature and soil there is an intensive destruction of primary minerals and rocks, rapid mineralization of organic remains and the relative partial accumulation of humus. In such circumstances, the gray soils are formed. In the gray soil of high biogenic activity leads to active tumor various classes of compounds, nutrients and other chemical elements.

High soil geochemical activity associated physicochemical and biogeochemical soil processes.

The presence of organic matter is a characteristic feature of soils that distinguish them from the parent rocks. The ground becomes soil only when it appears an organic substance. The initial accumulation of organic matter occurs as a result of life of lower organisms settling on the rocks and contributing to the transformation of these rocks in the soil. Biogeochemical processes play an important role in weathering. The breed is loosened, acquire high moisture content. Gradually the conditions for the growth and development of higher plants, especially demanding nutritional regime and physical properties of the soil to form organic matter, which contain amino acids and other substances.

Among them soil amino acids occupy a special place in the organic complex of the soil. They play an important role in soil fertility as a source of nitrogen nutrition and biologically active substances, as well as an integral part of humus substances. The formation and accumulation of amino acids is closely related to the activity of soil microorganisms and the root system of plants, and depends on the soil and environmental condition [1]. The presences of amino acids in soils in larger or smaller amounts greatly affect the level of effective soil fertility and yield of many crops.

In the soil constantly contains a certain amount of bound and free amino acids. The role of various amino acids in common organic complex of the soil varies. Usually, only a few have a pronounced impact. Amino acids

largely replace each other therefore functionally similar communities may have different amino acid. Different soils can vary significantly in the set and the quantitative ratio of amino acids, so that the complex can serve as a diagnostic sign. To quantitatively characterize the complex of soil amino acids it is possible to use approaches used in General ecology to comparative characteristics of community structure, in particular different diversity indices.

For example, a study of typical chernozem shows the content of humus in the 0–20 cm layer ranged from 2,50 to 3,11%. The reaction of the soil medium is slightly alkaline, a pH of 7,8. The specific weight of soil of 2,60 g/cm^3, a porosity of 50–60%, the bulk of 1,06 to 1,30 g/cm$^{3.}$ The studies were conducted in the second rotation crop rotation forage rotation during the field experience on the experimental base of the Academy of Sciences of Moldova "Biotron". Only in soils was, discovered 18 amino acids in typical black soil: aspartic acid, glutamic acid, glycine, proline, alanine, methionine, serine, valine, isoleucine, lysine, leucine, threonine, histidine, arginine, phenylalanine, cystine, tyrosine and γ-aminobutyric acid [2].

In the area between the Chirchik-Keles, occupying the foothill plains in Western Tien-Shan has in the right Bank of the middle reaches of the river Chirchik, where the studied soils formed on tertiary sediments and Neogene sediments of loess in the upper horizons was found 20 free amino acids [3].

Research shows that virgin, irrigated, rain fed, fallow soil also differ on the total number and composition of amino acids under various crops. They differ also within the same crop as organic and mineral fertilizers. In virgin soils, formed on tertiary red beds sediments in the upper levels of the amino acid content is 3,25–3,56 mg, fallow 1,63-of 2,56 in non-irrigated areas of 1,94–3,15 in, irrigated from 3,54–4,36 to 6,02–8,11 mg/100 g of soil. The use of fertilizers, i. e. agricultural land use differently affects amino acid content in the soil. In dry soil there is some increase in amino acids due to application of mineral fertilizers, residues of roots and straw of wheat in the irrigated soil of amino acids becomes even more due to the greater biomass. They are the result of the cultivation of wheat and activation of biological processes in the soil due to irrigation, and in deposits of amino acid content decreases in the absence of receipt of plant residues of wheat which is rich in amino acids and due to the lack of irrigation and fertilizers. The results of the research show that different crops have different impacts on the content and composition of free amino acids. The content of free amino acids in the upper horizons of soils under vineyards are not washed out version to 1,99–3,15, under the wheat of 2,43–4,98, under the cotton 3,30–4,82 under alfalfa 2nd year 3,33 to 4,97, near lucerne 3-year 4,36-of 5,98 under soybean cultivation 4,00-of 6,48 mg/100 g of soil.

This difference in total content of amino acids due to the specifics of each crop, its biomass composition, basal biological activity, etc. it Should be noted that under the crops of cotton, soybeans, the total content of free amino acids are not washed away in soils decreases with depth bole smoothly compared to other cultures, especially compared to wheat. The content and composition of free amino acids in virgin, rain fed, irrigated land vary. A study of rain fed soil under wheat showed that the amino acid content in the upper horizons was in the spring of 2,43–4,98 mg/100 g of soil. Here in the greatest numbers alanine 0,30-of 0,678; glycine 0,37–0,66; glutamic acid 0,32–0,51; aspartic acid 0,31–0,49; leucine 0,10–0,32; valine 0,19–0,24; threonine 0,19–0,22; proline 0,19–0,21; methionine 0,10–0,20; lysine 0,10 to 0,21 mg/100 g of soil.

It should be noted that the content of such amino acids at the beginning of next horizon is dramatically reduced. The profile is valine, methionine, leucine, lysine, cysteine, isoleucine, tryptophan, the content in the layer 20–41 cm is reduced compared to 0–20 cm layer 3–4 times, which is apparently related to patterns of development and biomass accumulation, distribution of root system of wheat. In the middle of the profile the amino acid content decreases sharply and is 1,25 mg/100 g of soil. In the lower part of the profile the content of all amino acids does not exceed 0,01–0,03 mg/100 g of soil. In the autumn period, the total number of amino acids in the upper horizons is 1,4–1,6 times less than in the autumn period 1,86–2,82 mg/100 g of soil [3].

When studying irrigated soil revealed that the total content of, free amino acids is higher than that of virgin and non-irrigated soils, probably due to irrigation and fertilizer and to improve soil properties, accumulation of greater biomass and the intensification of biological processes. So, in the upper horizons of the irrigated soils, the content of amino acids made up 3,00–5,24 mg/100 g

of soil. The study of soils under wheat showed that the total number of amino acids is of 2,43 to 4,08 mg/100 g of soil. These amino acids affect both biochemical and physiological-biochemical features of plants and animals.

In connection with this, all amino acids included in the composition of natural organisms, are divided into two groups: essential and nonessential amino acids. Essential amino acids valine, leucine, isoleucine, threonine, methionine, phenylalanine, tryptophan, lysine, histidine [4]. Nonessential amino acids are glycine, alanine, glutamic acid, aspartic acid, serine, cystine, tyrosine, proline, hydroxyproline, cysteine and arginine. Complete protein foods contain all essential amino acids. Their absence in the diet leads to disease and death of the animal crop rotation lag plant growth and development.

Amino acids included in proteins and most other natural compounds belong to the L–series, D-form amino acids are relatively rare, and not mastered by animals [4]. The diversity of peptides and proteins are built up from α-amino acids. The total number of α-amino acids, their component, closes to 70. Among them is the group of the 20 most important amino acids are constantly occurring in all the proteins (sometimes this group expand to 22–25 by including related derivatives). α-amino acids are crystalline substances, soluble in water. Many of them have a sweet taste.

Glycine NH_2CH_2COOH, also known as glycine, is found in the muscles of the lower animals and in some plants (in sugar beet). In a large number formed during the hydrolysis of proteins of silk. In alanine, valine, leucine and isoleucine hydrogen atom is substituted with glycine, respectively, methyl, isopropyl phenyl, isobutylene or sec-butyl residues; isoleucine has an asymmetric carbon atom is not only in α-position, but in the side chain. Proline α-carbon atom and the amino group optionally are connected by a three carbon chain, and thus, this amino acid is pyrrolidine-alpha-carboxylic acid [5].

Asparagine and glutamine represent mono amide acidic amino acids aspartic and glutamic. For peptides these amino acids characterized by good solubility in water.

In irrigated conditions with conventional cultivation techniques notes irrigation gliniana of gray in the middle. Where there is an increase in the factor of dispersion and destruction of the structure and porosity as a result of which change the redox potential of the soil, where there are soil free and bound amino acids. But it should be noted that in these processes involved more active amino acids. In these horizons the rise of the density of the soil, its deviation from the optimal parameters causes a reduction of seed germination, inhibition of root growth and the plants, etc., which changes the composition and properties of amino acids.

It must be remembered that many of the physic-chemical properties of soil, such as redox properties associated with the content of organic substances composed of amino acids. This loss of organic matter leads to a decrease in the contents of individual amino acids, where there is a qualitative change.

Every soil forming organic matter is characterized by physic-chemical conditions, soil pH and other properties.

Amino acids, as in proteins, and free, is found in various living organisms. So NH_2CH_2COOH glycine is found in the muscles of the lower animals and in some plants such as sugar beets. In the form of lycine $(CH_3)_3N^+CH_2COO^-$, a fully inner salt, it is found in some plants. Glycine can be formed by protein hydrolysis. On the basis of glycine obtained is low-toxic systemic herbicide "roundup" $(OH)_2OP\text{-}CH_2\text{-}NH\text{-}CH_2\text{-}COOH$, which is perfectly destroys broad-leaved weeds in plantations of fruit-berry cultures [6]. Therefore, it can be assumed that in our garden soil, provides, and also formed glycine and as a result of the hydrolysis of proteins during the period of application of phosphorus fertilizers, it is possible to expect reduction of contamination of garden broad-leaved weeds such as burdock, plantain, etc.

Years of our observations in the gardens and farms of the Fergana district made large provisions of phosphate fertilizers on the order of 250–350 kg/he of phosphorus in the early days of the introduction of the observed wilting and then the death of the plantain and burdock, which is obviously associated with the above mentioned reasons. Given show that the content of nitrogen, phosphorus and mineral elements in plants varies in wide limits and depends not only on the type and soil and climatic conditions and the group and fractional humus composition, and mineralogical composition of soils and soil-forming rocks and a number of other documented and undocumented factors that need to be addressed.

One must be aware that amino acids contain bound nitrogen in the form of H_2N–, HN= this potential nitrogen nutrient for plants. For example, under the

action of the enzyme arginase, arginine can turn into α, β-distinovalerian acid and urea. Education urea is nitrogen fertilizer.

Observations have revealed that in the field experience with the cultivation of potatoes, on the options, which was made of fertilizer in the amount $N_{150}P_{120}K_{25}$ kg/he in the fruit contains the protein to 1,75%, in the second embodiment, the introduction $N_{200}P_{160}K_{100}$ kg/he protein contained 1,92 percent, in the third embodiment, where the introduction $N_{250}P_{200}K_{125}$ kg/he, the protein content increased to 2,04% at the same infestation of broadleaf weeds decreased with increase of phosphorus in the soil, which leads to an increase in the number of roundup. But the growth of nitrogen fertilizers at the same time led to their growth in the fruits, therefore, negatively affecting the ease of potato.

With the growth of the amount of mineral fertilizers on the rise, wet shivering to 2,6% before 0,7% for control variant [7]. Wet decaying potato hydrolysis of protein and the formation of a number of amino acids such as glycine, alanine etc. As set forth above formed, a glycine as the result of biogeochemical processes turns roundup, which is affected by consuming the above mentioned weeds. From the above small review implies that soil amino acids should be examined comprehensively until their use in agriculture.

The main emphasis needs to be directed to their quantity and quality and their organic, inorganic complex compounds in a variety of irrigated and non-irrigated soils of the arid zone.

1. The influence of the quantity and quality of amino acids on the quantity and quality of humus and the humus condition of the irrigated and rain fed virgin gray soils and other soils.

2. Changes in amino acids composition of the soil depending on the type and subtype of soils and their degree of culture net, and condition of cultivated plants.

3. The influence of the elemental composition of soils on the quantity and quality of amino acids and their individual, group correlation.

4. Changes of amino acid composition of irrigated soil under the influence of mineral, organic fertilizers and crop rotation.

5. The influence of amino acid composition of soils on the quality and quantity of weeds in orchards, cotton, wheat.

6. The relationship of amino acid composition of soils and plants and their content of nitrogen, phosphorus and other nutrients.

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BIOMASS OF SOME HALOPHYTE PLANTS — AS RAW MATERIAL FOR BIOGAS

Abstract: At present, in the conditions of reduction of natural hydrocarbon reserves, development of alternative energy sources is one of the priority areas. This article presents data on the possibility of obtaining biogas as an alternative energy source from the biomass of halophyte plants. The results of the research presented in this article are of scientific and practical importance, which in the future will help in the development of new alternative energy sources.

Keywords: energy, alternative energy sources, renewable energy sources, halophyte, biomass, biogas.

According to the forecasts of UN experts in 2050, to meet all the needs of 9.3 billion people, it will be necessary to double the development in the creation of resources [13, P. 157]. One of the important factors of the existence of mankind is the availability of energy sources [1, P. 8]. In the historical development of human society, the amount of energy consumption per person exceeded by more than 100 times. Every 10–15 years in the world, the degree of energy consumption is doubled. According to experts, if energy consumption goes to the present level, then available oil reserves will last for 40 years, gas for 56 years and coal for 197 years [2, P. 7; 9, P. 33]. At present, natural gas is widely used in Uzbekistan as primary energy sources (91.8%), oil (7.0%), hydropower (1.3%), hard coal (0.01%) and others (0, 03%) [6, P. 17]. In Uzbekistan today, hydrocarbon reserves amount to approximately 5.1 billion tons in oil equivalent, in particular, oil reserves are 245 million tons, natural gas 1979 million tons and coal reserves of 2.85 billion tons in oil equivalent. Given the current growth rates of the population of our republic, it can be assumed that the available oil reserves will last for 10–12 years, natural gas 28–30 years, in coal reserves slightly more than 50 years [2, P. 8; 6, P. 18]. At present, it is possible to use plant biomass as a universal alternative source of obtaining environmentally friendly gas, fuel and electricity [10, P. 9527; 11, P. 448]. A large part of the territory of Uzbekistan is occupied by a steppe and desert zone. The steppe has a peculiar flora, which is mainly used as a feed for small cattle [4, P. 62; 8, P. 30]. The steppe territories of Uzbekistan, in particular Karnabchul

and Central Kyzyl Kum, are not actually used in agriculture. However, halophyte plants grow on this territory, the biomass of which can serve as an alternative source, which is an actual problem of today.

Based on the above literary analysis, we set the goal – to study the peculiarities of using biomass of some halophyte plants as a biogas feedstock. As an object of our research, we used the biomass of some halophyte plants belonging to the species – *Halocnemum strobilaceum* (Pall) Bieb, *Halostachys belangeriana* (Moq) Botsch, *Tamarix hispida* Willd, *Haloxylon aphyllum* (Minkw) Iljin and others (*Karelinia caspia, Climacoptera lanata* (Pall) Botsch, *Sueda microphylla* Pall). Experiments to determine the conditions and rate of biogas release from plant biomass were carried out, in mesophilic conditions, in a 5-liter laboratory reactor using the methods of Kukanova and others (2011), V. K. Verma and others (2007), and A. Kovalyov (1998), the chemical composition of biogas was determined by chromotography [5, P. 67; 7, P. 181; 12, P. 1665]. The research was conducted in the laboratories of the Institute of Microbiology of the Academy of Sciences of Uzbekistan and "UzFarmSanoat". The results obtained are shown in Tables 1 and 2, as well as in (Figure 1).

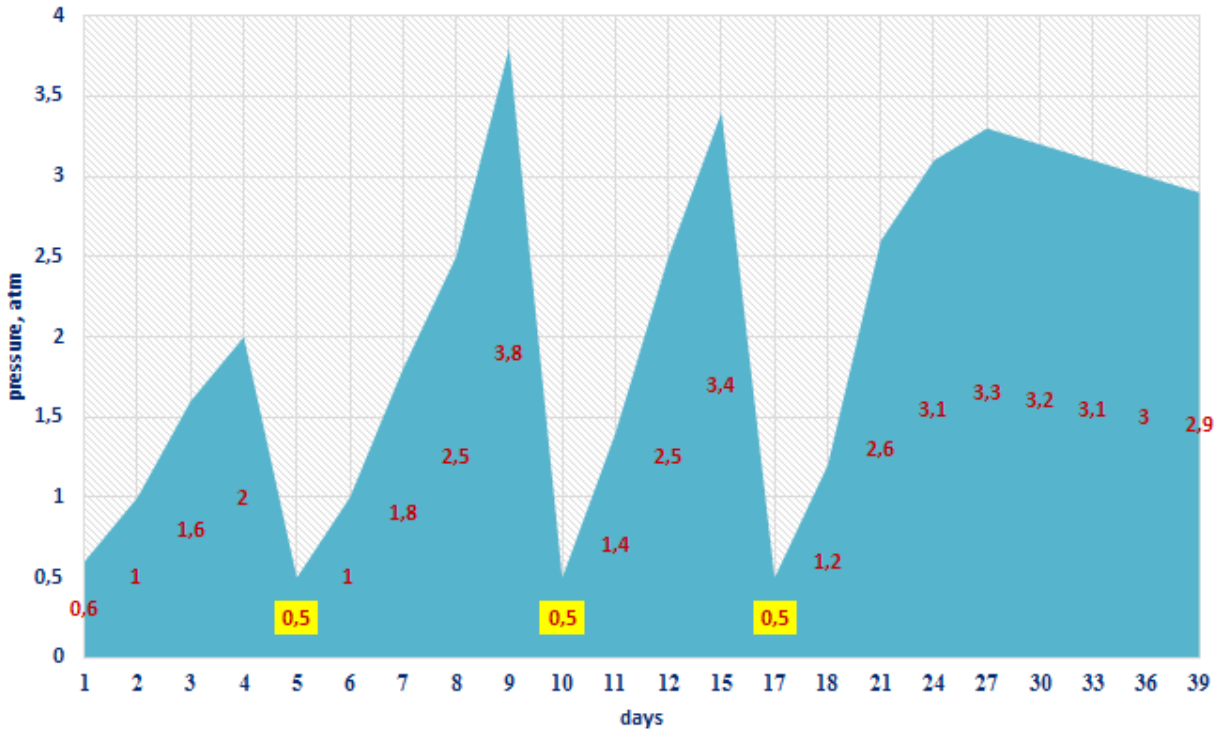

Figure 1. Rate of biogas production from biomass of halophyte plants (samples for chemical analysis were obtained on days 5, 10 and 17)

Table 1. – The amount of biogas obtained from the biomass of some halophyte plants, in m^3/kg

Types of raw materials	Reiteration				
	1	2	3	4	Average**
H.strobilaceum	0.29	0.28	0.32	0.25	0.29 ± 0.01
H.belangeriana	0.28	0.30	0.26	0.27	0.28 ± 0.01
T. hispida	0.31	0.29	0.25	0.24	0.27 ± 0.01
H. aphyllum	0.34	0.26	0.31	0.29	0.30 ± 0.01
Mixture of other halophyteplants *	0.24	0.22	0.25	0.29	0.25 ± 0.01

* *Types: K.caspia, S.microphylla и C.lanata;*

** $n = 4$; $P \leq 0.05$

Table 2. – Chemical composition of biogas obtained from the biomass of some halophyte plants, in% **

Raw materials	Days	CH_4	CO_2	Other gases
H.strobilaceum	5	22.8 ± 1.1	45.0 ± 0.8	32.2 ± 1.0
	10	31.1 ± 0.7	41.9 ± 1.1	27.0 ± 1.4
	17	57.8 ± 0.8	21.3 ± 0.7	20.9 ± 0.6
H.belangeriana	5	30.9 ± 0.7	53.0 ± 1.3	16.1 ± 0.8
	10	39.8 ± 0.7	35.7 ± 1.0	24.5 ± 1.2
	17	55.4 ± 1.0	26.6 ± 1.5	18.0 ± 0.7
T. hispida	5	28.0 ± 0.8	57.4 ± 0.6	14.6 ± 0.9
	10	40.2 ± 0.6	35.1 ± 0.6	24.7 ± 1.2
	17	53.3 ± 0.7	24.1 ± 1.0	22.6 ± 1.7
H. aphyllum	5	14.6 ± 1.5	50.1 ± 1.0	35.3 ± 0.7
	10	33.0 ± 0.9	46.3 ± 1.5	20.7 ± 1.4
	17	56.2 ± 1.1	34.0 ± 1.1	9.8 ± 2.0
Mixture of other halophyte plants*	5	10.5 ± 1.0	51.0 ± 1.4	38.5 ± 0.6
	10	36.7 ± 0.8	42.8 ± 1.1	20.5 ± 0.3
	17	47.8 ± 0.9	36.0 ± 1.1	16.2 ± 1.7

** Types: K.caspia, S.microphylla u C.lanata;*

*** n = 4; P ≤ 0.05.*

According to the results of the experiments, it is seen (Fig. 1) that in the mesophilic conditions (at a temperature of 25–37 °C), the biogas release process begins from the biomass of halophytic plants on the second day, and in the first five days the pressure in the reactor has risen to an average of 2 atm. On the 6–17th day of the experiment, the maximum increase in biogas formation was observed (in the reactor, the pressure rose to an average of 3.8 atm). In the following days, the formation of biogas in relation to the maximum index decreased by 15–20% (in the reactor the average pressure corresponded to an average of about 3 atm).

When using as feedstock halophyte plants, the resulting gas was on the average equal to 0,25–0,30 m^3 per 1 kg of dry biomass, respectively (Table 1). The maximum amount of biogas was obtained from biomass of *H. aphyllum* (average 0.30 ± 0.01 m^3/kg).

In the composition obtained from the biomass of halophyte plants, biogas (Table 2), the amount of CH_4, CO_2 and other gases was different.

On the 5th day of the experiment, after analyzing the results, it was determined that the amount of CH_4 extracted from the biogas research facilities is from 10,5% to 30,9%. The maximum amount of CH_4 in biogas was observed in the biomass of the *H.belangeriana* (average 30.9 ± 0.7%).

On the 10th day of this experiment, after studying the results of the obtained samples, we determined that in the biogas obtained from the biomass of plants, the amount of CH_4 is from 31.1% to 40.2%. At this stage, the maximum amount of CH_4 in the biogas was observed in biomass of the *T. hispida* (average 40.2 ± 0,6%).

On the 17th day of the process, after analyzing the samples, we determined that the amount of CH_4 in biogas from the biomass of the plant species studied was 47.8% to 57.8%. During this period, the maximum amount of CH_4 in the biogas was recorded in the biomass *H.strobilaceum* (average 57.8 ± 0.8%).

We determined that the amount of CO_2 and other gases in the separated biogas in the first days (day 5) of the experiment were high in quantitative terms, on the following days (day 17) these indicators decreased by an average of 28–35%.

Thus, the biomass of halophyte plant species – *Halocnemum strobilaceum* (Pall) Bieb, *Halostachys belangeriana* (Moq) Botsch, *Tamarix hispida* Willd, *Haloxylon aphyllum* (Minkw) Iljin and others (*Karelinia caspia, Climacoptera lanata* (Pall) Botsch, *Sueda microphylla*

Pall) the possibility of their use as raw materials for biogas production. Since, from 1 kg of dry biomass of this raw material, 0.25–0.30 m^3 of gas in the composition of which CH_4 averages 50–58% is released in mesophilic conditions for 12–20 days.

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Section 3. Geography

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FORECAST OF WASH INTENSITY FROM HIGH MOUNTAIN RIVER BASINS OF CENTRAL ASIA WITH THE CHANGE OF CLIMATE

Abstract: The paper considers the problems of forecasting the wash intensity of soils from the surface of the high-mountain river basins in Central Asia, taking into account climate change.

Keywords: river, high-mountain basin, glaciation, soil erosion, suspended sediment flow, climate change, climate scenarios, statistical evaluation, nomogram, forecast, washout intensity.

Introduction

Currently, the largest reservoirs of the Central Asia are Toktagul, which was built on the course of Naryn river, with a volume of 19,5 km^3 and Nurek — on the course of Vahsh river, with a volume of 10,5 km^3 etc. The main tasks of these reservoirs are the long-term regulation of the river flows of fed from the highmountain regions of Central Asia. Effective use of these expensive hydraulic structures, together with whole water and energy resources of the high-mountain part of Central Asia requires an assessment of the erosion of fine soil by rivers whose basins bear the modern mountain glaciation.

The main aim of this research is to improve the methodology of predicting soil washout intensity from the surface of high-mountain basins in river Central Asia under the climate change.

Data. The runoff of suspended sediments of the studying rivers, the air temperature taken into account at representative high altitude stations and the total area of glaciation of the basins were used as the main source materials.

Methods of research. In the study of prognostic dependence, the objective method of equalization and normalization of correlation relationships, proposed by Alekseyev [1], was applied. Different from climatomorphological model by Shcheglova [8], to characterize the temperature regime, the average height of the lower boundary of the glaciers was chosen. At the same time, the entire glaciation area of the river basin is taken into account. Recommendations of A. S. Shchetinnikov, A. N. Krenske and others [7] were used on calculating the average summer temperature at the level of the average height of the lower boundary of glaciers.

Results and discussion. As a result of special -estimation withusing objective method of equalization and normalization of correlation relationships the equation of normalized regression obtained the following form:

$$U_0(M_R) = 0.651 \cdot U_1(F_{glac}) + 0.453 \cdot U_2(t_{\text{VI-IX}}),$$

Where $U_0(M_R)$, $U_1(F_{glac})$, $U_2(t_{\text{VI-IX}})$ – are the normalized values, of the flush module, the total glacier area and the mean temperature at the average elevation of the lower boundary of the glaciers, respectively.

The tightness of the connection of this equation is characterized by a total correlation coefficient of 0,761 ± ± 0,035. On the basis of this equation, a nomogram for calculating the soil washout module (M_R) was constructed from the catchments of the snow-glacial fed and glacial-snow fed types according to the classification of Shchulz (Fig. 1).

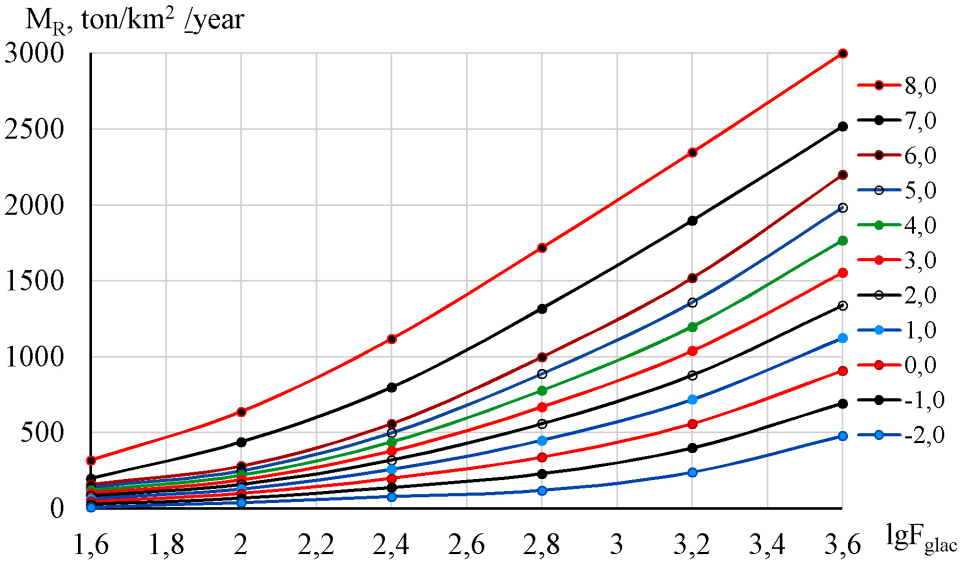

Figure1. Nomogram for calculating the flushing module (MR) from the catchments of the snow-glacier fed and glacier-snow types fed in the glacier basin area (lgF_{glac}) and the mean air temperature for June-September ($t_{IV–IX}$) at the mean height of the glacier ends

The constructed nomogram allows estimating the soil washout module from the surface of the basins of the studied rivers by their glacier area (lgF_{glac}) and average air temperature for June-September ($t_{IV–IX}$) at the average altitude of the ends of mountain glaciers.

It is known, currently the several models exist, e. g. global climate change scenarios recognized by the World Meteorological Organization (WMO): the MGFDL – Model of the Geophysical Fluid Dynamics Laboratory (USA), the MGISS – model of the Goddard Institute for Space Sciences (USA); the MUKMO – Model of the U. K. Meteorological Office, and the CCCM – model of the Canadian Climate Center. In the work we used these models in the interpretation of the scientists of Hydrometeorological Research Institute (NIGMI) of Uzhydromet, for the conditions of Central Asia (Table 1).

Table 1. – Changes in air temperature and precipitation according to models of global climate change

Climate model	Air temperature, ° C	Atmospheric precipitation, in%
CCCM	+ 6.5	–11
UKMO	+ 5.2	+ 6
GFDL	+ 3.4	+ 14
GISS	+ 4.7	+ 13

Note: (+) – increase in temperature or increase in precipitation; (–) – decrease.

In this research, the flushing intensity was estimated taking into account only the climatic changes, since the flow formation zone is mainly located in mountainous areas and does not have a strong influence of non-climatic changes as anthropogenic factors.

Estimation of the change in the runoff modulus of high-mountain rivers, due to changes in air temperature, according to different climatic scenarios is based on the nomogram (Fig. 1.)

Obtained results in (Table 2) indicate that the largest changes in the sediment runoff module are observed in the first climate scenario (CCCM). According to this model, increasing temperature at the lower boundary of the glaciers by a factor of 2.7 leads to an increase in the flushing modulus by 3.2 times. Relatively small flushing changes correspond to the third climatic scenario (GFDL), where as a result of a temperature increase of 1.9 times, the flow modulus increases by 2.1 times (Table 2).

Table 2. – Module for sediment discharge of the snow-glacial fed and glacier fed river types due to changes in air temperature according to different climate scenario

Hydroclimatic characteristics	Climate scenarios			
	CCCM	UKMO	GFDL	GISS
Average temperature at the lower boundary of glaciers, $\bar{t}_H$, °C	3.8			
Temperature increase,°C	10.3	9.0	7.2	8.5
Relative temperature rise $\bar{t}_H$	2.7	2.4	1.9	2.2
Average sediment discharge module, $\bar{M}_R$, ton/km^2	634			
Change of sediment discharge module, M_R, ton/km^2	2055	1764	1362	1624
Increase in relative sediment discharge module $\bar{M}_R$	3.2	2.8	2.1	2.6

In addition, it should be noted that a long-term change in air temperature affects the glaciomorphological parameters of mountain glaciers, especially their area. In estimating the change in the sediment runoff module, the decrease in glacier area of tion is also taken into account. The decrease in the area of glaciation by an average of 12.5% (A. S. Shetinnikov, 1997, 1998) does not lead to sharp decreases in the sediment flow rate of high-mountain rivers. In percentage terms, they vary within 7.6–9.2%.

Changes of state of glaciers and their parameters are also determined by the amount of precipitation. Therefore, while assessing changes in flushing from the high-mountain zone, it is necessary to take into account not only the changes in air temperature and atmospheric precipitation, but also the subsequent evolution of mountain glacier systems.

Conclusions. An assessment was made of the change in the intensity of the washout of soil from the catchments of the high-mountainous Central Asian region in connection with the expected climate change. Calculations performed according to different climatic scenarios showed the following: according to the climate scenario of the CCCM, the sediment runoff module increased average by 3,2 times with an increase in temperature of 2.7 times, and according to the GFDL model, as a result of an increase in temperature of 1,9 times, the modulus of flow increases 2.1 times. In general, when assessing changes in flushing from the high-mountain zone, it is necessary to take into account not only the changes in air and precipitation temperature, but also the degradation accompanying them, and evolution in the future (G. E. Glazyrin, 1985, 1991; A. S. Shetinnikov, 1997, 1998) of mountain glacier systems.

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Section 4. Information technology

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ALGORITHM TO THE METHOD OF PARTIAL SEARCH IN SOLVING THE PROBLEM OF ROUTING IN TELECOMMUNICATION NETWORKS

Abstract: the article proposes the method of partial search algorithm at the solution of routing tasks in telecommunication networks. Task solution completeness has been proved by the method of partial search. The task is solved real time system bathed on graph theory. Dynamic structure has been used in defining completeness of task solution.

Keywords: the problem of routing in telecommunication networks, Dynamic shortest path problem, multi parametric shortest path problem.

I. Introduction

Reliability and stable operation of telecommunication networks is ensured not only by the increase in technical capacity, it can also be implemented with software and optimal use of reserve paths.

It is known that for data exchange in the networks the routes are tabled and the data is transmitted on the selected route. It requires the effective use of algorithms, existing models, and as an example the following algorithms can be given: Dijkstra algorithm, Belman – Ford, Floyd – Varshal, as well as genetic neural algorithms of passing graph's points that determine the shortest path from one node to another; however the given algorithms fail in taking into account the reserve paths [1; 2; 3; 4].

The interception probability of found shortest paths between network nodes is very high at data transmission, and can result in network instability.

To prevent such situations, we use the paths which are close to the node of reserve paths instead of the shortest path taken out of the set of shortest ones, that proves to be one of the actual problems on network stability conservation.

An efficient algorithm for defining reserve paths for stability conservation in telecommunication networks in real-time mode has been proposed in this paper.

II. Problem statement

Assume that telecommunication networks are presented in the form of a graph. If each station on the graph is displayed as nodes, then there will be as many nodes on the graph as stations on the network.

Stations are interconnected, the connection coefficient is characterized by several parameters, such as: capacity, speed, cost, bandwidth etc. Taking into account these parameters, we encounter with the problem of multi-parameter or multicriteria optimization of reliability and network stability. The solution of the multiparametric dynamic problem is an actual problem in telecommunications.

Task. To create an algorithm for defining the routes of shortest L-reserve paths between nodes with taking into consideration the graph parameters in a dynamic mode which provide network stability.

III. Algorithm of Partial search

Let the graph G = (v, A). There are two methods to describe the graph structure: the methods of square matrix and adjacency matrix. At small amount of connections between graph's nodes the adjacency matrix is used, which economizes storage capacity of technical equipment [5; 6].

Assume that L-reserve paths, which are necessary to determine the route, and M-statistical connection variables where v1, v2, C, V, t present the following:

1) v1 and v2 – nodes (endpoints), 2) C – coefficient of capacitance between nodes v1 and v2; 3) V – speed between nodes, and 4) t – time of data flow between nodes in the channel.

Let's enter the value for marking the resistance coefficient of internode communication:

$$K_{ij} = \left\lceil \frac{t_{ij}}{c_{ij} V_{ij}} 100\% \right\rceil \in (vi, vj)$$

The smaller the coefficient K_{ij}, the lower is the resistance for the data to flow between nodes i and j.

We mark another initial reference as a dynamic quantity nogM, which describes the amount of load between two nodes representing one of the initial parameters of the variable. Internode load is nog_{ij} and duration of load – $nogVaqt_{ij}$.

Considering given symbols, the partial search algorithm derived for can be represented as modular algorithms.

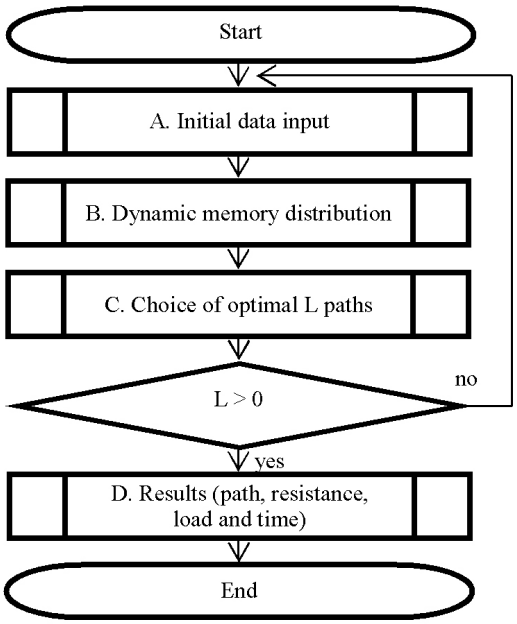

Figure 1. The module of partial search algorithm.

Shown in Figure 1, modules of partial search algorithm are the following:

A. Initial data input module – this module deals with the algorithm which forms initial data with adjacency matrix of the graph;

B. The module of memory distribution – in this module the variables are given the initial values and the inversion structure **of renewed memory** for strong dynamic structural variables is worked out as well. Thus, an operation of technical device memory is organized;

C. The module for L-paths choice – the method of alternative path routing and new value designation in a created dynamic structure has been developed in this module. The principle of Dijkstra algorithm has been used and its modification has been created. Dijkstra algorithm is designed to find only a "minimal" path, while the created modification can define another shortest reserved paths. Thus, L – paths are formed in this module;

D. Results (path, resistance, load, time) – in this module the following results are derived:

- The coefficient of interstation resistance is defined;
- L-paths are listed;
- Load and loading time is defined;
- Suitable or unsuitable paths are chosen;
- Geography of interstation data transmission is shaped.

A. Initial data input algorithm

Step 1. Value input. ***N, M, L. N*** – the number of graph nodes, ***M*** – the number of connections in the graph, **L** – the number of reserve paths to be found.

Step 2. Looping from 1 to ***M*** is established and ***v1, v2, C, V, t*** variables are entered. At each cycle ***K*** is to be

a resistance coefficient and stored as a point in the ***Ages*** structure. Here **K =] (t/(CV)) * 100%** is calculated according to the formula.Thus, the variables ***v1, v2, C, V, t*** are described by the coefficient ***K***. ***Ages*** – adjacency matrix of connections.

Step 3. Input of load value in ***nogM*** connections.

Step 4. Looping 1 to ***nogM*** and input of variables ***x, y, PP, TT***, where ***PP*** – the duration of load and the ***TT*** – the duration of load time in the direction of node ***x*** to node ***y***. At each cycle values are loaded into matrix ***nog*** and ***vaqt***. Here ***nog [x] [y] = PP, nog [y] [x] = PP*** and ***vaqt [x] [y] = TT, vaqt [y] [x] = TT*** are described this way.

B. Dynamic memory algorithm distribution

Step 1. ***D [1] [1] = 0*** Initial value is given.

Step 2. ***inf*** => ***maxNumber***, – variable. inf is assigned the maximum value.

Step 3. Each element of ***D [N] [L]*** matrix is filled with inf variable. ***D*** is used for finding the path with minimal resistance.

Step 4. Each element of ***Used [N] [L]*** matrix is filled with the value ***false.*** Matrix used is necessary to determine if nodes were used or not for finding a minimal path. If a node has been used, then the node is assigned the appropriate value ***true*** to the variable ***used***.

Step 5. ***List*** structure declaration. ***List*** structure is used to store the minimum and close to minimum ***L***-paths from one node to another.

C. Algorithm of choice for L- optimal paths

The module ***L***- optimal paths choice is considered to be the main module to the algorithm. Then the module on the basis of Dijkstra algorithm has been derived, which maintains close to the minimum ***L***-path, but not a minimum path of each node.

Step 1. Let's give to first line and first upper element of ***List*** matrix first element of ***List [1] [1] = 1*** node respectively. We consider the node as an initial node.

Step 2. For browsing all of the items, starting with the first one, the cycle 1 to ***L*** is created.

```
for (i ->1, n*L)
{
          v -> 0, k -> 0
          for (j -> 1, n)
{
               for (j2 = 1, L) {
                    if (not used[j]
[j2] and (v=0 or d[j][j2] < d[v][k])) {
                         v->j;
                         k->j2;
                         }
               }
          }
```

Here are the values of ***v = 0, k = 0.*** Indices ***v*** and ***k*** are used to mark passage from selected point to the next unused point. Having created two cycles it is possible to check all the elements. If the path ***j j2*** and ***v = 0 "not used [i] [j2]"*** was not checked from node to node, or ***d [j] [j2] <d [v] [k]*** distance is short from the selected point to a new transition point, then the found node is saved and the selected point is marked as tested, in other words:

used [v] [k] = **true**;

Step 3. All adjacent paths for node v are stored in the input module. Here at v columns of ages matrix, when *j* = 1, L, a cycle is created. The purpose of this cycle is the follow:

If a new found path proves to be better than the path which was saved earlier (i. e., its resistance will be weaker than that of the other path out of ***L***-set), this case a new found path is included into the ***L***-set and to be resorted;

If a new path is not available in ***L***-set of paths, this case, the new path is directly included into the ***L***-set.

The distance is also taken into consideration while searching these paths. The search process will be completed after the ***L***-paths have been defined, passing from this node to the next in increasing order. This process is performed for each node.

```
for (Point to : ages[v]) {
          for (j -> 1, L) {
               if     (d[v][k]+to.y<
d[to.x][j] and  !(to.x in  List[v][k]))
{
                    for (j2 ->L,j;) {
                         d[to.x][j2]
-> d[to.x][j2-1];
                    List[to.x]
[j2] ->clear
          List[to.x][j2] -> List[to.x]
[j2-1] all the found paths are added
                    }
                    d[to.x][j]    ->
d[v][k]+to.y;
                    List[to.x][j]-
>clear
```

```
                        List[to.x][j] ->
all the found paths are added
                        List[to.x][j]
->to.x element is added
                        Complete the cy-
cle
                }
}
}
}
```

Step 4. In the result of operation of partial search algorithm's module ***B***, the selected ***L***-paths are stored in the structure of ***List***.

D. Result module algoritm (path, resistance, load, time), algorithm modules

Step 1. A cycle 1 to ***L*** is created. Selected ***L***-paths are entered, resistance coefficient is defined, Load duration and load time are calculated.

```
for (i -> 1, L) {
```

Step 2. If the ***List [n] [i]*** element is free, it means that the paths are completed and the cycle stops.

```
if (List[n][i]if blank) {
      print in(i+"-there is no short path
from it");
      Completing the cycle;
}
print(i+"-short path : Coefficient load
="+d[n][i]+", Number of nodes=" +
len(List[n][i])+", List: ");
for (j -> 0,Len(List[n][i])-1) {
      print(Len(List[n][i])+"->");
}
print(List[n][i].get(Len(List[n][i])-
1)+" Loading: ");
```

Step 3. In this step the shortest path ***i***, the resistance coefficient, the paths and the number of paths are resulted.

```
print(i+"- short path: resistance co-
efficient ="+d[n][i]+", Number of nodes
="+len(List[n][i])+", List: ");
for (j -> 0,Len(List[n][i])-1) {
      print(Len(List[n][i])+"->");
}
print(List[n][i].get(Len(List[n][i])-
1)+" Load: ");
```

Step 4. In this step the shortest path ***i*** and load coefficient are resulted.

```
nogSum-> 0;
for (j = 0,Len(List[n][i])-2) {
      x-> List[n][i].get(j);
      y -> List[n][i].get(j+1);
      nogSum->nogSum +nog[x][y];
}
x-> List[n][i].get(Len(List[n][i])-2);
y-> List[n][i].get((List[n][i])-1);
nogSum->nogSum +nog[x][y];
print(nogSum+", Time: ");
```

Step 5. In this step the shortest path ***i***, time duration of load are given.

```
nogVaqt-> 0;
for (j -> 0,Len(List[n][i])-2) {
      x-> List[n][i].get(j);
      y-> List[n][i].get(j+1);
      nogVaqt->nogVaqt +vaqt[x][y];
}
x-> List[n][i].get(Len(List[n][i])-2);
y-> List[n][i].get(Len(List[n][i])-1);
nogVaqt->nogVaqt +vaqt[x][y];
println(nogVaqt);
```

IV. Algorithm test

For example, suppose that there given a graph with 7 nodes and 9 intermodal communications. The parameters of graph connectivity can be divided into two types: statictical and dynamic.

Statistical parameters:

C – capacity coefficient; ***V*** – network transmission speed; ***t*** – time of transmission.

Dynamic parameters:

Nog – load coefficient between any nodes; ***Vaqt*** – load duration between any nodes in time expression.

The statistical parameters are given above the lines of graph's nodes connections, and the dynamic parameters are shown below (Fig. 2).

Based on the initial data entered into the algorithm, the results are the following:

1-short path: Coefficient load = 16, Number of nodes = 5,

List: 1->3->5->4->7 Load: 5, Time: 4

2-short path: Coefficient load=17, Number of nodes = 4,

List: 1->2->4->7 Load: 0, Time: 0

3-short path: Coefficient load = 17, Number of nodes = 5,
List: 1->2->5->4->7 Load: 4, Time: 2
4-short path: Coefficient load = 21, Number of nodes = 4,
List: 1->3->6->7 Load: 2, Time: 7
5-short path: Coefficient load = 22, Number of nodes = 6,
List: 1->3->5->2->4->7 Load: 1, Time: 2
6-short path: Coefficient load = 24, Number of nodes = 6,
List: 1->2->5->3->6->7 Load: 3, Time: 9

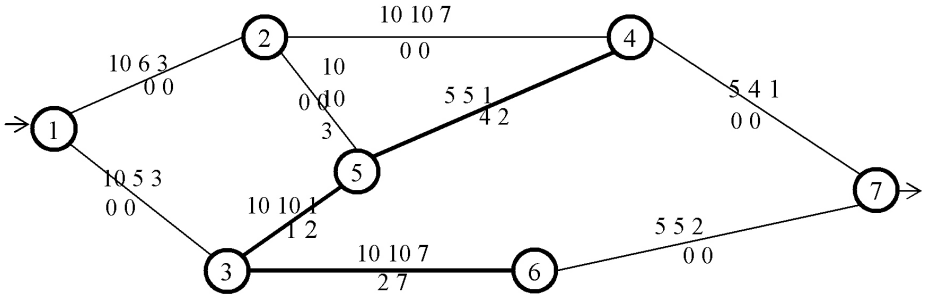

Figure 2. The graph structure for algorithm test.

Table 1.

Statistical variables					Dynamic variables			
v1	*v2*	C	V	t	*v1*	*v2*	Loading	Time
1	2	10	6	3	3	5	1	2
1	3	10	5	3	3	6	2	7
2	5	10	10	3	4	5	4	2
2	4	10	10	7				
4	5	5	5	1				
3	5	10	10	1				
3	6	10	10	7				
6	7	5	5	2				
4	7	5	4	1				

Results: resistance coefficient between 1 and 2-paths is very low, but path 2 must be chosen. As path 2 is not loaded, it is free. The use of given reserve path for data transmission ensures network's stable operation.

Conclusion

The algorithm of partial search method as a modular algorithm for routing problem solving in telecommunication networks has been submitted. The completeness of task solution by application of partial search method has been proved. In defining the completeness of task solution a dynamic structure has been used.

Algorithm for defining the route of shortest L-reserve paths that ensure network stability has been elaborated with taking into account graph's parameters in a dynamic mode.

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CARDIAC FAILURE — PROSPECTS OF TREATMENT IN UZBEKISTAN

Abstract: This article shows the current state of high-tech methods for chronic cardiac failure treatment in the Republican Specialized Cardiology Center of the Republic of Uzbekistan. The data allow to state that the significant differences in specialized approach to chronic cardiac failure treatment are better than those associated with death-rate reduction and quality of life improvement. The Republican Specialized Cardiology Center's experience shows positive results, which must certainly be extended to all regions of the Republic. For today, almost all regions have x-ray angiographic units that allow carrying out percutaneous interventions, installing pacemakers and carrying out other high-tech methods of treatment.

Keywords: cardiac failure, chronic cardiac failure, left ventricle, ejection fraction, angiotensin-converting enzyme inhibitor, cardiac resynchronization therapy, percutaneous interventions, aortocoronary bypass.

Currently, the purpose of patients' treatment with diagnosed cardiac failure (CF) is to improve clinical status, functional ability and quality of life, prevent frequent repeated hospital admissions and reduce death-rate. The fact that some drugs for CF treatment showed a negative impact on long-term results, despite the positive impact on short-term surrogate markers, it led to new recommendations for acute and chronic cardiac failure (CCF) diagnostics and treatment development (Rome, 2016). A new class of drugs acting on renin-angiotensin system and neutral endopeptidases system (angiotensin receptor neprilysin inhibitor) has been developed. The first drug from this group is LCZ696, a substance that consists of fragments of valsartan and sacubitryl (inhibitor of neprilysin). Due to neprilysin inhibition, the natriuretic peptide, bradykinin and adrenomedullin destruction slows down. This leads to diuresis increase, left ventricle (LV) of heart relaxation improvement, its reverse remodeling [1]. A drug under the trade name Uperio is registered in the Republic and is recommended

as a substitute for angiotensin converting enzyme inhibitors (ACE inhibitors) in order to further reduce the risk of hospital admission and death of outpatients with CF with low-ejection fraction (CF-lEF) who still have symptoms and signs of cardiac failure, despite the optimal treatment by ACE inhibitors, beta-blockers and antagonists of mineralocorticoid receptors [2].

It should be noted that for two decades the view on a patient with CF who receives only standard drug therapy is getting out of date. This is due to significant changes in technology of patients' treatment, reflected in the latest recommendations of the European Society of Cardiology. Today, the patient with LV CF-lEF < 40% and II–IV of FC according to NYHA should be considered as a potential candidate for: coronary revascularization (under cardiac angina or multivessel disease availability), cardiac resynchronization therapy – CRT/CRT-D (under left bunch branch block and QRS ≥ 150ms), implantable cardioverter defibrillator (for secondary prevention of sudden cardiac death, survived after ventricular fibrillation or ventricular tachycardia), as well as surgical correction of valval cardiac failure [2].

The application of high technologies by Uzbek physicians and organization of centers not only in Tashkent but also in the regions of the Republic, capable of conducting a comprehensive specialized examination and preparing patients for high-tech interventions, make the task of attracting physicians working at all levels of medical care to be urgent.

Organization of CH departments in the Republican Specialized Cardiology Center (RSCC) and regional cardiac health centers staffed by personnel specializing in therapy of this particular state, has significantly improved the results of treatment.

The leading role at the stages of patients' follow-up is assigned to a medical specialist in CF who actively uses more modern treatment programs compared with conventional cardiologists and closely interacts with cardiac surgeons, surgeons-arrhythmologists and other specialists. Invasive coronary angiography is recommended for patients with cardiac failure and cardiac angina pectoris resistant to drug therapy or with symptomatic ventricular arrhythmias or cardiac arrest in anamnesis (for whom myocardial revascularization can be conducted) in order to establish the coronary heart disease diagnosis and coronary artery disease severity [3]. Based on the results of STICH study, aorto-coronary bypass (ACB) is recommended for patients with CF with LV ejection fraction (EF) of less than 35% with significant stenosis of coronary artery (anterior interventricular branch of left coronary artery, multivessel coronary channel disease) in order to reduce lethality and rate of hospital admission in case of cardiological reasons [4]. Over the past two years (2016–2017), more than 3,000 coronary-angiographies were performed at the RCAC of the Ministry of Health of the Republic of Uzbekistan (Table 1). In more than 200 cases, percutaneous interventions (PI) were performed in patients with low LVEF < 40%. Revascularization results analysis with the help of percutaneous interventions (PI) showed that LVEF after intervention on the average in the group was 43.5 ± 6.9% according to EchoCG. LVEF increase was observed in 62% of patients, with no dynamics in 11%, and a slight decrease with no proved significance was observed in 15% of patients. The fatality was developed in 12% of patients, which is qualified as sudden cardiac death. It should be noted that during the follow-up period (24 months), death from progressive refractory cardiac failure was not observed in either case. The revascularization contributed to a significant regression of pathological remodeling, as evidenced by the following: end-diastolic LV volume before PI was 237.7 ± 57.9 ml, and after 200.3 ± 57.9 ml ($p = 0.007$), end-systolic LV volume was 150.1 ± 49.4 and 108.3 ± 38.9 ml, respectively, before and after the procedure [5].

It should be noted that the positive dynamics in functional status, quality of life and severity of cardiac angina were observed regardless of CCF manifestations intensity and degree of LV contractile function suppression. The stationary stage of treatment with the use of PI has led to a significant improvement of myocardium contractile function according to EchoCG. The period of follow-up of patients with PI treated is more than 2 years. According to the results of stage examination in 24 months, the majority of patients demonstrated the previously achieved clinical hemodynamic effect and functional status preservation.

Meta-analysis of studies related to PI study in patients with low LVEF conducted by V. Kunadian et al. 2012 showed that hospital lethality is 1.8%, and long-term death-rate (within 24 months) is 13.6% [5]. The results of our center have similar indices with previous studies in other countries on positive effects and lethal outcomes rate.

Referring to STICH studies, in European recommendations it is stated that induced myocardial ischemia or cardiac angina availability doesn't define the persons with poor prognosis and doesn't determine the advantages of ACB before standard therapy. Nevertheless, ACB actually reduces the symptoms of cardiac angina better than just standard therapy. ACB technique improvement allowed operating patients with higher risks. RSCC cardiac surgeons made 279 ACBs, at that 56 (20.1%) of them had LVEF less than 40%. Many researchers have shown that surgery on a beating heart has several advantages over the classic myocardial revascularization using artificial circulation technique. At the same time, low LVEF in patients is not a contraindication to revascularization on a beating heart. To date, the main hypotheses explaining the mechanism of method action find the convincing confirmation. Potential beneficial effects of PI and ACB in CCF are the reduction of LV disfunction severity associated with myocardial ischemia: direct hemodynamic effect on post- and preload, coronary blood flow and cardiac output, activation of angiogenesis, development of collateral circulation. Adequate blood flow provision in areas of vital myocardium due to revascularization contributes to reverse LV remodeling and myocardium contractility increase. In addition, ischemia – myocardium electrical instability substrate elimination – can suppress the arrhythmogenic focus, which will ensure the prevention of arrhythmic sudden death in patients with CCF of ischemic etiology.

Rheumatic valvar heart diseases in the absence of adequate treatment rapidly progress and lead to pulmonary hypertension, dilatation and right ventricular dysfunction. Formed relative tricuspid insufficiency is a predictor of CF progression. More than one third of patients with mitral stenosis have moderate relative tricuspid insufficiency. Cardiac surgeons of our center performed a tricuspid valve surgical correction in patients with rheumatoid genesis mitral defects. According to the literature, the rate of severe CF in the absence of timely surgical correction can reach 81%. Distant survival within 3 and 5 years cannot be more than 65 and 44%, respectively [6; 7]. The results of our center demonstrate that patients who undergone tricuspid valve autoplasty under mitral valve prosthetics have better survival rates and a rapid positive dynamics of CF clinical manifestations. Within the next 3–6 months, the positive shifts in intracardiac hemodynamics indicators (reduction of right ventricle and atrium size, end-diastolic and end-systolic LV volume) were observed.

The main problem for patients with severe aortic stenosis and low LVEF is a low flow and a low pressure gradient in aortic valve (valve area < 1cm^3, EF < 40%, mean pressure gradient <40mmHg). If the average pressure gradient is > 40 mm Hg, then theoretically EF allows performing aortic valve replacement operation. Transcatheter aortic valve implantation (TAVI) is recommended for patients with severe aortic stenosis who, by decision of a team of specialists, can't be surgically treated. For the last 2 years, 5 patients were treated by using TAVI method. Dynamic monitoring of patients continues.

CCF increases the risk of sudden cardiac death from life-threatening ventricular tachyarrhythmias. An important method for treating the patients with CF is a cardiac resynchronization therapy (CRT), which contributes to survival improvement in real clinical conditions [8]. In RSSC, 103 electric cardiac pacemakers were implanted, including 21 cases of patients with LV dysfunction. It should be specially noted that CRT-D was implanted in 5 patients (2 with ischemic and 3 with dilated cardiomyopathy). The accumulated brief experience of resynchronizing devices implantation indicates that the response to the procedure is individual. Three patients demonstrated a rapid response with expressed positive dynamics of clinical and functional indicators during the first 3 months after CRT implantation. In 2 cases, no evident positive dynamics during the follow-up period (24 months) was observed. According to the literature data, the early response to CRT is associated with cardiac remodeling degree of reversibility in long-term follow-up period; however, other authors did not reveal this relationship [9; 10; 11]. Dynamic monitoring of the patients continues.

Thus, a brief description of the modern high-tech methods of CCF treatment in RSSC of the Ministry of Health of the Republic of Uzbekistan makes it possible to state that the most significant differences in specialized approach to CCF treatment have the best indicators, with which a reduction of mortality and a quality of life improvement are associated. The main differences of specialized approach to CCF treatment in comparison with the generally accepted approach are the actual implementation of strategic tasks to the fullest extent. The RSSC experience shows positive results, which certainly must be extended to all the regions of

our country. To date, in practically all areas, there are X-ray angiography units that allow carrying out PI, pacemaker installation and other high-tech methods of treatment.

In conclusion, it should be recalled that trainings about CF implementation for doctors, patients and their relatives contribute to a better understanding of the actions taken, which ultimately results in greater adherence of patients to treatment and clinical outcomes improvement (3). Trainings carrying out based on cardiac dispensaries are usually more effective due to greater concentration of patients and opportunities to visually demonstrate the achievements of modern cardiology.

Table 1. – High-tech methods of research and treatment in RSCC (2015–2017)

High-tech methods of research and treatment	Number of studies	Number of patients with EF lower than 40%
Electrophysiological study with radiofrequency ablation	239	19
Implantation of pacemakers (including CRT-D)	103 (5)	21 (5)
PI with CA stenting	1522	128
Transcatheter aortic valve implantation (TAVI)	2	–
Aorto-coronary bypass	279	56
Valve replacement	120	70

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MODERN ASPECTS IN PREDICTING THE CLINICAL COURSE OF CHRONIC HEPATITIS C

Abstract: the aim of the study was to evaluate the diagnostic significance of markers of inflammatory activity and fibrosis in the clinical course of chronic HCV infection. The subject of the study were 107 patients with chronic hepatitis C and liver cirrhosis, as well as 80 healthy donors. The revealed changes in the clinical characteristics, biochemical parameters, genotypes of the virus C, polymorphism of inflammatory regulators and isoenzymes of cytochrome P450 and their interrelation should be taken into account in predictive diagnosis of the disease and in the development of further tactics of therapeutic measures. The obtained data can serve as an additional factor in assessing the risk of progression of the disease course and liver damage and be taken into account when discussing indications for therapy.

Keywords: Chronic hepatitis C, genetic profile.

Relevance. Due to the wide prevalence and high incidence of viral hepatitis C present an urgent medical and social problem for world medicine. Infection with hepatitis C virus on average 85% of cases leads to chronic infection, prolonged viral replication, progressive damage to liver tissue, development of fibrosis and cirrhosis. According to various estimates, 20–30% of patients with chronic viral hepatitis C (CVHC) develop cirrhosis within 20 years, the character of fibrosis progression being nonlinear [1]. The problem of chronic hepatitis and cirrhosis of the liver, in addition to widespread use, is due to the development of complications and unfavorable prognostic effects in persons of working age [2; 3].

It should be noted that the lack of pronounced symptomatology and delayed adverse outcomes often make it difficult to diagnose the disease in a timely manner. Despite the advances in the study of the pathogenesis of viral liver damage, up to the present time questions of assessing the prognosis of the course and outcomes of chronic viral hepatitis remain open. In connection with the widespread, increasing incidence, peculiarities of the clinical course and the formation of complications leading to disability, an intensive study of the problem of chronic hepatitis C is underway.

This problem is being actively studied by domestic and foreign researchers.

Important issues of medical practice are the development of methods for predicting the course of H-infection and the improvement of therapy, based on an understanding of the pathogenesis of the progression of HCV. In recent years, there have been significant successes in the study of some mechanisms of the progress of CHC. It is established that such factors as gender, age at the time of infection, obesity, drug use, alcohol abuse are of great importance. However, the importance of other prognostic factors, such as regulators of inflammation of cytokines and cytochrome P450 isoenzymes that affect the clinical course of the disease, is not fully understood to date, and the results of previous studies are contradictory [4; 5].

The aim of the study was to evaluate the diagnostic significance of markers of inflammatory activity and fibrosis in the clinical course of chronic HCV infection.

Material and methods. The subject of the study were patients with CVHC and cirrhosis of the liver, as well as healthy donors, in which DNA samples were obtained. According to the results of clinical and laboratory studies, 107 patients aged 22 to 81 years were included in the main group. All patients were persons of Uzbek nationality living on the territory of Uzbekistan.

To assess the association of polymorphic markers of the genes TNF-*a*, CTLA-4 and cytochrome P450 isoenzymes by polymerase chain reaction, the representatives of the main group were divided into three subgroups. The first subgroup included patients with HCVC with a moderate degree of activity (n = 33). The second group consisted of patients with HCVC with a high degree of activity (n = 37). The third group included patients with cirrhosis of the liver (n = 37). Diagnosis of chronic viral hepatitis C and liver cirrhosis was established on the basis of a set of clinical and laboratory and instrumental examination data, generally accepted in clinical hepatology.

Research results and discussion. In the course of the study, HCVC patients were divided into subgroups depending on the activity of alanine aminotransferase. In assessing the clinical manifestations of liver damage, the following syndromes have been identified in patients enrolled in the study: asthenic, manifested by fatigue, irritability, rapid fatigue, painful (heaviness and/or pain in the right upper quadrant), dyspepsia (abdominal discomfort, lack of appetite, belching, heaviness in the epigastric region). It should be noted that only in 86.9% of patients clinical manifestations of asthenic nature were found. These data demonstrate the importance of targeted clinical examination in patients with CHC and indicate the need for "alertness" to liver disease in patients with asthenic, dyspeptic and pain syndromes. A significant role in assessing the activity of the hepatic process in viral hepatitis is given to the study of the level of activity of serum aminotransferases, bilirubin, gamma-glutamyltransferase, alkaline phosphatase. Biochemical blood indices revealed cytolysis syndrome in patients, which was characterized by an increase in the activity of alanine aminotransferase (ALAT) and aspartate aminotransferase (ACAT) in the blood serum, and cholestasis syndrome, which was manifested by hyperbilirubinemia, increased activity of alkaline phosphatase and gamma-glutamyltransferase. Patients also had mesenchymal inflammatory syndrome (an increase in thymol test) and hepatic-cell insufficiency syndrome (change in albumin content).

During the research it was revealed that in the subgroup of patients with moderately active HCVF, the ALT level exceeded the norm values by an average of 6.6 times. The activity of ALT in a subgroup of patients with highly active HCVC was 2.5 times higher than in the first subgroup. In a subgroup of patients with cirrhosis of the liver, the ALT level in our study was the lowest (3.3 times), but still significantly exceeded the control parameters. It should be noted that among all persons of the main group the most significant increase in ALT was observed in carriers of polymorphic variants of A/A TNF-α in the 1 and 2 subgroups (199.1 ± 25.37 U/L and 454.1 ± 31.0 U/l, respectively). In the third subgroup, the genotype G/G of the CYP2E1 gene (91.4 ± 0.0E/l) had the highest level of ALT.

In the study of AST in a subgroup of patients with moderately active HCVF, the level of this indicator exceeded the average values by 4.4 times, and in the subgroup of patients with a highly active HCVF it was 9.8 times higher. In a subgroup of patients with cirrhosis of the liver, the AST level exceeded the control indicators by 5.5 times. Evaluation of the effect of genotypic variants of the studied polymorphisms on the AST level showed that the highest values of this index in the first and second subgroups of patients were associated with the polymorphic version of TNF-α (A/A). At the same time, in the subgroup of patients with moderately active HCVC, this indicator was 114.2 ± 11.41 U/L, in the subgroup of patients with a highly active HCVC, 285.2 ± ± 10.60 U/L. In the subgroup of patients with cirrhosis of the liver, the most significant increase in the AST concentration was observed in carriers G/G CYP2E1 (147.3 ± ± 4.60 U/L). In the subgroup of patients with moderately active CVH, the bilirubin level exceeded the norm by an average of 3.1 times, and in the subgroup of patients with high active CVHC and with cirrhosis – 3.9 and 3.5 times, respectively. Evaluation of the influence of genotypic variants of studied polymorphisms on the level of bilirubin showed that the highest values of this index in the second and third subgroups of patients were associated with polymorphic variant CYP2E1 (G/G). And in the first subgroup the highest concentration of

bilirubin was observed in carriers of TNF-α (A/A). At the same time, in the subgroup of patients with moderately active HCVC, this indicator was 54.6 ± 3.19 μmol/l, in the subgroup of patients with highly active HCVC, 64.1 ± 0.0 μmol/l, in the subgroup of patients with cirrhosis of the liver – 73,1 ± 0,0 μmol/l. In our study in a subgroup of patients with moderately active HCVF, the level of alkaline phosphatase (AFP), which is an indicator of cholestasis syndrome, was 3.7 times higher than the normals, and 6.4 times in the subgroup of patients with highly active HCVF. In a subgroup of patients with cirrhosis, the level of AFP decreased in comparison with the second group, but exceeded the control indicators by 4.4 times, and remained above the parameters of the first subgroup. Evaluation of the effect of genotypic variants of the studied polymorphisms on the level of alkaline phosphatase showed that the highest values of this index in the first subgroup of patients were associated with polymorphic variants of TNF-α (A/A) and was 317.2 ± ± 65.98 U/l. And also high indexes of AP in the first subgroup were observed in carriers CYP2E1 (S/C) – 290.2 ± ± 17.36 U/l. In the second group of patients – with polymorphisms CYP2E1 (G/G) – 592.7 ± 0.0 Ud/l and CTLA4 (G/G) – 569.1 ± 41.10 U/l. In the third group of patients, the highest values of AF were observed in patients with polymorphism CYP1A2 (A/C) – 376.6 ± ± 13.10 U/l. In our study it was shown that the level of GGT in patients with moderately active HCVC exceeds the norm by an average of 6.5 times. In patients with highly active HCVC, higher GGT values were observed and exceeded the norm by 7.5 times. When the disease progressed to the stage of liver cirrhosis, the GGT value in all cases was significantly decreased in comparison with both the second ($P < 0.05$) and the first group ($p < 0.05$), although it exceeded the control parameters by 3.3 times. Evaluation of the influence of genotypic variants of studied polymorphisms on the level of gamma-glutamyltransferase showed that the highest GGT indices in a subgroup of patients with moderately active HCV were associated with polymorphic variants of TNF-α (A/A) – 182,7 ± 12,15 U/l. The highest GGT indices in the subgroup of patients with highly active HCVF were associated with polymorphic variants of TNF-α (A/A) – 198,3 ± 13,05 U/l, and CYP2E1 (G/G) – 221,3 ± 0,0 U/l. The highest GGT indices in a subgroup of patients with liver cirrhosis were associated with polymorphic variants of CYP2E1 (G/G) – 88,1 ± ± 0,0 Ud/l, CTLA4 (G/G) – 83.8 ± 4.20 U/L and CYP1A2 (C/C) – 91,1 ± 0,70 U/l.

In addition, in all the study groups, a close correlation was found between the activity of cytolysis and cholestasis with polymorphic variants of the studied regulators of inflammation and isoenzymes of cytochrome P450 ($p < 0.05$).

The analysis of the obtained data showed that, regardless of the genotypic variant of polymorphism, the level of all the studied biochemical parameters was significantly deviated from the normal values (control). Shifts of the biochemical parameters studied by us changed in one direction or another as the inflammatory process progressed in CVHC and during the transition of the disease to the stage of cirrhosis. However, the genotypic variants to some extent determined the severity of the abnormality. The results indicate that polymorphic variants associated with a high level of cytolysis and cholestasis may be markers of unfavorable CVHC.

Among the patients examined, genotypes of HCV were determined. The prevalence analysis showed that the genotype dominated and amounted to 72.9%. Our studies showed that genotype 3a was 23.4% of patients. Genotype 2a was less common than other identified genotypes (3.7%).

The relationship between the studied biochemical parameters and the genotypes of the virus C in patients with existing subgroups was analyzed. Thus, in the first subgroup, the most pronounced changes in biochemical parameters, in particular AST, ALT, bilirubin, were noted in carriers of the genotype of the hepatitis C virus. In the group of patients with transition to cirrhosis, carriers with a 3a genotype were distinguished by the severity of clinical and biochemical indices. In patients with cirrhosis of the liver, biochemical parameters were higher in those who had a genotype of 2a.

Conclusion. Summarizing the above data, it can be concluded that among the patients with chronic liver pathology the genotype 1c of the virus C prevailed. In addition, the features of the clinical course and association of the genotype of virus C with biochemical indices were determined at different severity of the course of CVHC. The main clinical manifestations were accompanied by pronounced cholestatic, cytolytic characteristic syndromes. Also, the determination of the genetic

profile in patients with CHC may serve as an additional factor in assessing the risk of progression of the disease course and liver damage and be taken into account when discussing indications for therapy.

Risk alleles were identified that characterize the progressive type of HCV flow, which can influence the production of pathogenetically significant factors, which leads to the activation of pathological mechanisms (genotype G/G of the CYP2E1 gene and genotype C/C of the CYP1A2 gene) and characterizing the "favorable" type of disease progression – (genotype of the A/A gene of TNF-α).

The revealed changes in the clinical characteristics, biochemical indices, genotypes of virus C, polymorphism of inflammatory regulators and isoenzymes of cytochrome P450 and their interrelation should be taken into account in predictive diagnosis of the disease and in the development of further tactics of therapeutic measures.

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ANTI-REMODELING EFFICIENCY OF PREPARATIONS SUCH AS PERINDOPRIL, VEROSHPIRON AND BISOPROLOL APPLIED TO PATIENTS WITH DIASTOLIC CHRONIC HEART FAILURE AND METABOLIC SYNDROME

Abstract: The aim of this work is to study the anti-remodeling efficiency of complex pharmacotherapy of diastolic left ventricular dysfunction of chronic heart failure (CHF) by use of perindopril, veroshpiron and bisoprolol in patients with metabolic syndrome (MS). The study involved 76 male patients with chronic heart failure (CHF) II–III FC, with post infarction cardiosclerosis. Depending on the components of MS the patients were divided into 3 groups: Ist group (n = 27), patients without MS; Group II (n = 24, patients with a combination of dyslipidemia (DLP) with abdominal obesity (AO) and arterial hypertension (AH); Group III (n = 25), patients with a combination of AO, AH and DLP with diabetes 2. A three-month treatment with an implement of the Perindopril, Bisoprolol and Veroshpiron combination in patients suffering from CHF without MS promotes regression of non-adaptive remodeling of myocardial left ventricular and improvement of diastolic function of the heart. The most marked resistance against therapy exists when there is a combination of AO, AH and DLP with diabetes 2 types.

Keyworlds: chronic heart failure, metabolic syndrome, systolic and diastolic left ventricular dysfunction.

The problem of treating the patients with chronic heart failure (CHF) remains to this day one of the unresolved issues of modern cardiology [3]. Traditionally, CHF was associated with a violation of the contractile function of the myocardium. According to modern perceptions about the pathophysiology of CHF syndrome, systolic dysfunction can be considered as one of the variation factors in left ventricular geometry and volumes (LV), myocardial hypertrophy, changes in wall stress and diastolic filling structure, i. e. the concept of LV remodeling [4; 19]. However, in recent years it has been stated widely that an important role in determining both clinical status and prognosis in patients with CHF is also related to diastolic LV myocardial dysfunction [5; 11; 15].

A special significance is acquired by development of diastolic CHF in patients with metabolic syndrome (MS). Structural changes and violations of diastolic function (DF) of the left ventricle are associated with MS components, such as obesity, insulin resistance, hyperinsulinemia and dyslipidemia [10; 13; 14]. Recent studies have demonstrated a relationship between MS and diastolic dysfunction of the myocardium [7; 15]. It has been revealed that MS is associated with an increase of preejection period, namely isovolumic relaxation time of LV, regardless of LV remodeling and afterload intensity. Fuentes L. Et al. (2007) confirmed the diastolic dysfunction in MS patients and demonstrated that diastolic dysfunction is increased with progression of MS regardless

of LV mass [12]. Thus, in pathological myocardial remodeling in case of CHF in patients with MS not only hemodynamic, but also metabolic factor is involved.

The aim of this work is to study the anti-remodeling effectiveness of complex pharmacotherapy of diastolic LV dysfunction (LV DD) in CHF with application of perindopril, bisoprolol and verospirone in patients with MS.

Methods and materials

The study involved 76 male patients with chronic heart failure (CHF) II–III FC, with postinfarction cardiosclerosis. The recentness of myocardial infarction was from 6 months to 5 years. The diagnosis was verified on the basis of the classification of the New York Heart Association (NYHA), a six-minute walk test (SMWT) and rating scale of clinical state (RSCS). The average indicator for SMWT was 304.7 ± 19.3 m (274–338). 3 groups of patients were differentiated depending on the components of MS: Group I (n = 27), patients without MS; Group II (n = 24) patients with a dyslipidemia combination (DLP) with abdominal obesity (AO) and AH; Group III (n = 25) patients with a combination of AO, AH and DLP with diabetes 2 types.

In MS diagnosis, the diagnostic criteria of the International Diabetes Federation (IDF, 2009) were used. The main components of MS were: abdominal obesity (AO) (> 94 cm for men); level of triglycerides (TG > 1.7 mmol/l); cholesterol level of high-density lipoproteins (CLHDL < 1.03 for men); the level of BP (SBP > 130 mm Hg, DBP > 85 mm Hg), glucose level in the fasting state (> 5.6 mmol/l) or type 2 diabetes mellitus.

The examined patients were on inpatient treatment in Cardiology Department of the City Clinical Hospital No. 7 in Tashkent. The patients were examined on the basis of a contract at the City Medical Consultative and Diagnostic Center in Tashkent. The Echocardiography (Echocardiogram) was fulfilled on the Mindray apparatus (China) using the method of lying and left side in M and B modes in accordance with the requirements of the American Association of Echocardiography (ASE). LV diastolic function was judged by the maximum velocity of the early peak of diastolic filling (VmaxPeak E, 0.62 m/s), the maximum rate of transmittal blood flow during left atrial systole (VmaxPeak A, 0.35 m/s), and the E/A ratio 1,5–1,6), the time of isovolemic relaxation of the left ventricle (IVRT), the early diastolic filling delay (Dt deceleration time).

All patients were advised to use use perindopril (Prestarium, Servier), bisoprolol (Concor, Nycomed), as well as veroshpirona (Gedeon Richter) 50 mg/day within the three months period. Perindopril titrated at a dose of 4 mg to 8 mg, bisoprolol titrated at a dose of 5 mg to 7.5 mg.

Statistical analysis of the obtained data was carried out on a personal computer of IBM PC/AT type using a package of standard electronic program "biostatic for Windows, version 4.03". The parameters were described in the form of M ± m. In the distribution of values, group comparisons of quantitative variables were carried out using the Student's variation statistical criterion (t).

Research Results

In the third study group, the shortening degree of A-P diameter of the left ventricle in systole decreased by 19.2% ($p < 0.01$). Patients with MS differ by more pronounced manifestations of diastolic dysfunction, as evidenced by a significant RA increase in patients of the Groups 2 ($p < 0.05$) and 3 ($p < 0.01$) groups with a slight decrease in PE, as well as a decrease in E/A ratio by 7.6% ($p < 0.05$) and 19.5% ($p < 0.01$), respectively. Violation of the transmittal blood flow is associated with an increase in preejection period, namely isovolumic relaxation time LV by 8.6% ($p < 0.05$); 15.9% ($p < 0.01$), as well as the delay of early diastolic filling by 13.4% ($p < 0.05$) and 21.7% ($p < 0.01$) in the 2nd and 3rd groups respectively. Violation of the systolic and diastolic function of the LV causes the intense work of LP. The data obtained indicate that in patients without MS, the changes detected in the left ventricle do not affect the LP condition, while in patients with MS there is an increase in its size. At the same time, if in the second group this indicator is increased by 6.2% ($p < 0.05$), in the third group the difference reaches 12.1% ($p < 0.01$) and goes beyond the permissible range.

After 3 months of treatment of patients with CHF by applying perindopril, bisoprolol and veroshpiron, we obtained the data (Table 1), which indicate a significant positive dynamics from Echocardiography and Doppler echocardiography in patients without MS. In patients with MS, especially in Group 3, a weak dynamics of the analyzed indicators was revealed.

Table 1. – The diastolic function of the LV in patients with CHF II–III FC, depending on the M

Indicators	Research terms	Group I (n = 27)	Group II (n = 24)	Group III (n = 25)
Dt, mc	before treatment	189.67 ± 8.5	215.08 ± 8.91*	230.83 ± 9.52**
	after 3 months	166.78 ± 6.88°	189.76 ± 8.68	213.8 ± 10.7**
IVRT, mc	before treatment	85.2 ± 2.05	89.28 ± 2.81*	95.29 ± 2.75**
	after 3 months	78.15 ± 2.51°	81.82 ± 2.53	88.38 ± 2.51*
%ΔS,%	before treatment	37.16 ± 1.73	35.19 ± 1.34	32.47 ± 1.53*
	after 3 months	40.18 ± 1.88	38.49 ± 1.45	35.66 ± 1.42
PE, m/c	before treatment	0.59 ± 0.018	0.57 ± 0.019	0.54 ± 0.021
	after 3 months	0.65 ± 0.018°	0.61 ± 0.019*	0.57 ± 0.016**
PA, m/c	before treatment	0.50 ± 0.016	0.53 ± 0.018*	0.58 ± 0.017**
	after 3 months	0.43 ± 0.018°	0.46 ± 0.019°	0.52 ± 0.015°**
E/A	before treatment	1.18 ± 0.042	1.08 ± 0.054*	0.93 ± 0.027**
	after 3 months	1.51 ± 0.045°°	1.33 ± 0.041°*	1.10 ± 0.039°**
Ps in min	before treatment	75.37 ± 1.72	76.92 ± 1.96	77.4 ± 2.36
	after 3 months	70.04 ± 1.58°	73.29 ± 1.37	74.72 ± 1.99

*Note: * – p<0,05; ** – p < 0,01 the reliability of the difference in indicators in comparison to Group I.*
Note: ° – p<0,05; °° – p < 0,01 the reliability of the difference in indicators before and after treatment.

The examined patients also differ according to results of influence of treatment on diastolic function of LV. A significant improvement in this function is observed in patients without MS, as evidenced by a statistically significant decrease in preejection period, namely isovolumic relaxation time of LV, early diastolic filling delay and maximum atrial systole, as well as an increase in the maximum rate of early diastolic filling of the LV and E/A ratios. However, in patients with MS, especially in the third group, a decrease in Dt and IVRT, the increase in PE was insignificant and the difference in these parameters between the 1st and 3rd group remained high, reaching 28.2% (p < 0.01), 13.2% (p < 0.05) and 12.3 (p < 01), respectively. In addition, despite a decrease in RA (p <0.05), it was 20.9% higher (p < 0.01) and an increase in E/A, this ratio was lower by 27.2% (p < 0, 01) in comparison with the 1st group (Table 1).

It was revealed that there is dependence of the current variations MS type [9], which are not conditioned by hemodynamic factors. However, there are very little data available and they mainly refer to MS in case of AH. According to the results of this study, it was found that in patients with CHF in case of AO, AH and DLP, the structural changes in the myocardium are more pronounced than in patients without MS.

The LVMH is considered as an independent marker of high-risk cardiovascular diseases, including sudden death, and significantly affects the mechanism of diastolic dysfunction (DD) of formation of the left ventricle [19]. In this regard, the important aspect of this problem is the availability of data on the relationship between DD and MS [15]. It can be even regardless of the weight of the LV. The relationship between MS and LV DD was also reflected in the results of this study. Patients with MS (AO+AH+DLP), in contrast to patients without MS, are characterized by more pronounced manifestations of DD, an increase of IVRT, DT and RA, as well as a decrease in E/A. The addition of diabetes 2 types to the above mentioned manifestations of MS significantly worsens DD, which manifests itself in a further increase in IVRT, DT and RA, as well as a decrease in E/A. An important role in this case is given to the time of isovolemic LV relaxation, which increases with MS, regardless of LV remodeling and afterload intensity [14]. Recently, the CHF is more associated with DD in individuals with normal EF (ejection farction) [7; 12]. However, in patients with severe MS symptoms, in Group III, there is a significant decrease in the shortening degree of anteroposterior LV into systole.

ACEI, β-blockers and spironolactones are considered to be the leading means in the treatment of patients with CHF [6]. Three-month treatment by means of perindopril, bisoprolol and veroshpiron in patients without MS is characterized by a positive dynamics of diastolic function (DF) of the LV, which was manifested by a decrease in IVRT, DT, improvement in the transmittal spectrum (decrease in RA, increase in PE and E/A).

After the treatment, against a background of a significant decrease in RA and an increase in E/, the 2nd group is significantly inferior to patients without MS and in terms of the transmittal spectrum. The results of the comparative analysis showed that the heavier form of MS (AO+AH+DLP+ diabetes 2 types) in patients with CHF reduces the effectiveness of combined use of perindopril, bisoprolol and veroshpiron to a greater extent. Statistically, significant positive dynamics in these patients after treatment is traced only by RA and E/A. Despite the positive dynamics of transmittal blood flow, this function in these patients remains significantly low in comparison with patients without MS.

Conclusions

1. The presence of MS in patients with CHF is an important factor in enhancing diastolic LV dysfunction, which is most pronounced in the combination of DLP, AO and AH with diabetes 2 types.

2. A three-month treatment with a combination of perindopril, bisoprolol and veroshpiron in patients with CHF without MS contributes to the improvement of diastolic function of the heart.

3. MS in patients with CHF reduces the anti-remodeling effectiveness of combined drug treatment using perindopril, bisoprolol and veroshpiron, which depends on the representation of its components. The most pronounced resistance to the therapy is available with the combination of AO, AH and DLP with diabetes 2 types.

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STUDYING OF LEVEL OF SATISFACTION WITH WORK OF TEACHERS OF TASHKENT MEDICAL ACADEMY

Abstract: Degree of satisfaction with work depends on a set of factors, both internal, and external in relation to the person. However at a big variety of factors and various orientation of their influence on the person, in Tashkent medical academy the following characteristics of work on which degree of satisfaction of professorial teachers with the work rather steadily depends are selected: character and content of work; the volume of the performed work; condition of a workplace; relations with the principal and colleagues; compensation; possibilities of advance on work; schedule, rules of conduct, etc.

Keywords: medical higher educational institution, teacher, satisfaction with work, questionnaire, social conditions.

The teacher of the higher school, especially medical school, of the social reserving is called to solve a problem of formation of the student not only as future expert of high professional level, but also as healthy person, the healthy person, bringing up at the same time positive, constructive reference points and putting installations on universal values and also – on a reasonable and purposeful way of life [4, 63–68].

The complexity and variety of the changing social conditions and factors defining and mediating health of the population demand carrying out social and hygienic researches which would cover several or set of the interacting factors defining through behavior of people various implications of vital activity, indicators of their health [5, 16–21].

The profession of the teacher of the higher school is one of the most difficult and noble. Professional realization and compliance to the increasing demands of time dictate need not only continuous education of the teacher, rising of its qualification, but also the corresponding health [1, 1–24]. The general and methodological culture, quality of teaching, efficiency and assessment of results of scientific and pedagogical work, the social status of the teacher and many other questions are considered in many articles [2, 95–99] now. In our republic of the researches devoted to assessment of various aspects of quality of teachers of higher education institutions it wasn't carried out earlier.

The objective of this research consists in studying of level of satisfaction with work of teachers of Tashkent medical academy.

On the basis of questionnaire the level of satisfaction with work as the major component reflecting the relation of teachers of medical schools to own professional activity is determined.

It is known that the level of satisfaction with work is not only one of the most important indicators of overall performance of the modern teacher, but also the indicator of effectiveness of the changes and transformations happening in higher education institution [3, 26–29]. For this reason carrying out monitoring of satisfaction of the faculty with the work is necessary at assessment of the social status.

On a complex of questions: "What you most of all appreciate in the work what gives you pleasure?" respondents answered as follows: good money – 37 people (30,8%); good collective – 82 people (68,3%), interesting work – 82 people (68,3%); the reliable place of work – 73 people (60,8%); prestige of work in society – 58 people (48,3%); a possibility of implication of an initiative and independence – 33 people (27,5%); a possibility of advance, development of professional

potential – 47 people (39,1%); feeling of personal responsibility – 58 people (48,3%); the good organization of work and the management – 54 people (45%). In addition respondents answered that they are satisfied by communication with students, training process, the good principal, respect of employees, etc.

At the same time, some aspects of labor process had negative assessment: work low-paid – 33,3%; work uninviting – 5%; it isn't enough opportunities to prove – 4,1%; there aren't enough conditions for advance, development of professional potential – 10%; low prestige of work in society – 10%; working conditions unsatisfactory – 6,6%; there is no friendly staff – 9–7,5%; there is no accurate organization of work and the management – 5–4,1%. Most of teachers (more than 90%) indicated more loads bound to veneering of documentation.

Level of the organization and security of educational process in many respects influence satisfaction of employees with work in higher education institution therefore it was offered to teachers of departments to estimate the level of the organization of educational process. From among respondents consider that educational process is adequately provided with scientific, methodical professional literature – 67,5% (81), computers and office equipment – 64,1% (77), writing-materials – 37,5% (45), the equipment for work (office, laboratory, etc.) – 16,6% (20), library resources – 51,6% (62), electron resources, legal databases, the Internet, etc. – 50,8% (61).

Thus, the satisfaction with work of professorial teachers of Tashkent medical academy is closely bound to loyalty of employees, devotion of employees of the organization, their desire to apply a maximum of efforts in its interests, and to some extent – with their health.

The fact that their salary is the main source of income of their family is considered by 75,8% (91) of respondents, 67,5% (81) of respondents aren't engaged in other types of paid work. 32,5% (39) respondents are engaged, besides the main work in this establishment, in other types of paid work for the following reasons: low level of payment on a primary place of employment – 10% (12), the main work leaves a lot of free time – 0,8% (1), additional work more creative, interesting – 5,8% (7), additional work gives higher degree of independence – 5,8% (7), additional earnings will never prevent – 20,8% (25). Whether on a question they feel socially protected now, 51,6% (62) respondents answered «yes», 12,5% (15) respondents answered «no», 35% (42) respondents found it difficult to answer.

Conclusions:

1. In general the faculty of Tashkent medical academy shows rather high degree of satisfaction with work at institute.

2. Degree of satisfaction with work depends on a set of factors, both internal, and external in relation to the person. However at a big variety of factors and various orientation of their influence on the person, in Tashkent medical academy the following characteristics of work on which degree of satisfaction of professorial teachers with the work rather steadily depends are selected: character and content of work; the volume of the performed work; condition of a workplace; relations with the principal and colleagues; compensation; possibilities of advance on work; schedule, rules of conduct, etc. The priority of these characteristics can significantly differ at certain employees in the organization.

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THE ROLE OF THE NURSE IN EARLY DIAGNOSTICS CERVICAL DISEASES

Abstract: every woman should undergo a prophylactic examination every year throughout her life. Correct and competent organization of the nurse's work of the examination room, contributes to the increase of detectability of cervical disease and can be one of the most promising and effective forms of preventive examination of the female population.

Keywords: Disease, cervix, nurse.

Diseases of the cervix in the modern world are common among women. At the same time, there is no tendency to reduce their number. In general, such diseases are typical of young women who are in the reproductive age. The pathology of the cervix is one of the most frequent gynecological diseases and is diagnosed in 25–45% of women [1; 2].

Recently there has been a trend towards an increase in the number of cases of cervical disease at a young age (15–24 years), which is explained primarily by the early onset of sexual life, frequent changes in sexual partners, infection with various sexual infections, which often end with abortions.

The most important method of secondary prevention of DC is to conduct a total screening of the female population using a simple unified method (clinical examination or preventive examinations, since the progression of subclinical forms of DC to the stage of cervical cancer takes a long time (10–15 years), the purpose of screening is diagnosis early disease and treatment in the period of precancer [3; 4].

Research objective. Show the importance of nursing a woman for the early detection and prevention of cervical disease.

Materials and methods. The study was conducted on the basis of gynecological offices in the Central Polyclinic of the Bektemirsky district, polyclinic № 4 of Mirzo Ulugbek district, polyclinic № 60 of the Yakkasaray district and polyclinics № 23 and 25 of the Uchtepa district in 2015–2016.

All studies were conducted by a nurse, in the presence of a doctor, 1019 women were examined.

Results and its discussion. A significant role in solving the tasks assigned to early diagnostics of DC is assigned to the work of nurses in the examination rooms. The main task of the nurse of the examination room is to examine women with the purpose of revealing tumoral and premalignant diseases. Mostly these are people from a contingent of unorganized population, which is especially important, since among them there are often elderly and elderly women, especially those who are at risk of DC. Experienced specially trained nurses, participating in regular trainings, work in the examination rooms. The nurse of the examination room uses all available methods of examination: questioning, examination, palpation, bimanual examination, cytological examination. These methods do not compete with each other, but complement each other. A close inspection, oncological alertness and knowledge allow the nurse of the examination room to detect precancerous diseases and cancer. Before the beginning of the examination, the nurse conducts a survey, paying attention to the menstrual cycle, the presence and appearance of pain and atypical blood secretions in the intermenstrual period and in menopause. An important stage in the work of the nurse of the examination room is a gynecological examination. In the study, the nurse evaluates the condition of the mucous walls of the vagina, the presence of foci of hyperemia around the outer throat of the cervix, and the formation of an outward projection in the form of a "tongue" can be observed, the formations resembling the "cauliflower" characteristic of cervical cancer.

Currently, it is generally accepted that active detection of ZSH without cytology is impossible. Under the conditions of the examination room, the nurse takes the

cellular material for cytological examination from the entire surface of the cervix and from the cervical canal. The collection of material for cytological examination is taken by all women without exception, regardless of the presence of complaints and examination data. In case of suspected pathology, the nurse of the examination room directs the patients to the appropriate specialist for an in-depth examination. If a malignant neoplasm is suspected, the form of the alarm notice of the examination room is filled in, which is sent to the primary oncology room.

The study included data on preventive examination of 1019 women who had a reproductive history on a specially developed questionnaire, and a gynecological examination was performed. The examination included examination of the skin and mucous membranes of the preanal area and the vulva, palpation of the inguinal lymph nodes, examination of the cervix and vagina with the help of mirrors. When conducting a clinical and visual examination, the cervix was examined first without mucus removal and treatment with solutions. The examination was done clockwise, the color, relief, borders of the flat and cylindrical epithelium, the location and state of the vessels were studied. Then, the state of the mucous cervix was studied by tests with 3% acetic acid solution and 0.5% lugol solution (clinico-visual method) and the epithelial response to the above effects was determined.

Among the women we examined, two groups were identified: 1 group consisted of women, practically healthy, the second group included women with a positive "clinical-visual test", that is, with various pathological changes in the cervix. Patients of this group were referred to the doctor for colposcopy, examination of the smears of prints from the surface of the exoendocervix by the method of the papanikolaou, or to the histological examination of the biopsy material (as necessary).

Women with confirmed gynecological disease came under clinical supervision to doctors of the appropriate profile, for further treatment and follow-up. The results of the in-depth examination were recorded and used to calculate morbidity according to the medical examination. The conducted activities allowed:

– determine the frequency of DC detection according to the medical examination for 100 women examined;

– to determine the most significant and common pathologies of the cervix uteri in the studied group in the range of age characteristics and place of residence;

– determine the effectiveness of clinical and visual examination of the cervix, conducted by a nurse.

The primary incidence is in this case the number of newly diagnosed diseases per 1000 women of childbearing age. According to official statistical data, the highest level of primary morbidity was observed in Khamzin (13.6 ± 0.5% 0), Chilanzar (12.9 ± 0.4% 0), Bektimir (9.8 ± 1.1% 0) and Mirabad (9.2 ± 0.6% 0) areas. The lowest incidence rates were recorded in Uchtepa (1.0 ± ± 0.1% 0), Shaykhantohur (2.7 ± 0.2% 0) and Yakkasarai (2.7 ± 0.2% 0) areas.

Special studies show that 40–60% of women in active reproductive age suffer from gynecological diseases. A significant part of the structure of gynecological morbidity is made up by the cervical diseases that we study, which very often transform into chronic forms, lead to functional disorders of the female reproductive system and require long-term treatment. It should be noted that the level of primary incidence of DC, which are mainly represented by erosion and ectropion and, most importantly, it was revealed over the years studied in Tashkent city tended to decrease.

Conclusions. An important role in the identification of patients with various pathological conditions is the prophylactic examinations conducted by the nurse in the outpatient and polyclinic stage. Reducing mortality from cancer depends not so much on improving treatment methods, as on the timely diagnosis of premature diseases. The referral to the examination room is mandatory for all women who first applied to the clinic.

Correct and competent organization of the nurse's work of the examination room, contributes to the increase in the detectability of the incidence of the cervix and can be one of the most promising and effective forms of preventive examination of the female population.

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THE ACTIVITY OF MATRIX METALLOPROTEINASES AND THEIR INHIBITORS IN PATIENTS WITH SCLERODERMA

Abstract: A study of the level of matrix metalloproteinases (MMP-2, MMP-7, MMP-9) in the serum of 29 patients with systemic and 35 patients with limited scleroderma showed a decrease in their activity against the increase in their inhibitors (TIMP-1 and TIMP-2), especially in patients with systemic scleroderma. The level of serum TGF-β1 increased significantly, and was also more pronounced in patients with systemic scleroderma. Correlation analysis of the relationship between MMPs and TIMP parameters with TGF-β showed strong feedback with MMP-2, MMP-7 and MMP-9, a direct strong association with TIMP-1 and TIMP-2, more pronounced in the systemic course of the disease.

Keywords: systemic and limited scleroderma, matrix proteinases, matrix metalloproteinase inhibitors, transforming growth factor of fibroblasts.

The scleroderma (SD) takes the second place in the structure of modern dermatology. The scleroderma pathogenesis is not fully determined. Among the main causes of sclerotic changes in a skin, activation of fibrogenesis processes due to the extracellular matrix disturbance is being discussed [9; 10]. Structural components of extracellular matrix proteins are collagen, elastin, proteoglicans and glycoproteids, their levels are controlled with the participation of a specific class of the proteolytic enzymes known as matrix metalloproteinases (MMPs) [3]. MMPs in many respects determine activity of a series of biologically active molecules, such as cytokines, interleukin (IL–Iβ), tumor factor of necrosis α (TFN-α), the transforming growth factor of fibroblasts β1 (TGF-β1), the vascular endothelial growth factor (VEGF) playing a dynamic role in the metabolic processes influencing the cellular proliferation, differentiating migration, apoptosis and angiogenesis. These enzymes provide structural integrity and an elastance of vascular walls. MMPs lead to degradation of the denatured collagen, a fibronectin, laminin, elastin, a vitronectin through their collagenolytic and elastinolytic effects for the purpose of their utilization and formation of the new, fully functioning molecules.

Gelatinase (MMP-2, MMP-9) are capable to hydrolyze a fibrillar collagen of the 4th type, and elastase – MMP-7 is produced by vascular cells and inflammatory cells, such as macrophages and polymorphonuclear

neutrophils [1; 2]. The high activity of MMP-2, MMP-9 and MMP-7 is associated with processes of angiogenesis and apoptosis [4]. MMPs expression in physiological conditions is regulated by a series of specific inhibitors which differ on specific action on metalloproteinases. It is established that fabric the inhibitor of metalloproteinases – I (TIMP-1) most actively inhibits MMP-9 while TIMP-2 suppresses activity of MMP-2 [5]. MMP-7 decreases at an expression of TIMP-3 and TGF-β1 [6]. The braking influence TGF-β1 on a catabolism of MMPs sharply strengthens the factor of body height of a connecting tissue raising an expression of TIMP-1 and TIMP-3, the activity of MMP-2 [7; 8] oppresses.

The comparative small molecular mass and solubility in biological liquids provides the ability of MMPs TIMP to get to a vascular blood stream in the quantities proportional to a fabric expression that their definition in blood serum allows. In recent years various MMPs, TIMP and TGF-β1 survey as diagnostic and prognostic markers, change of their activity to normal amounts reflects clinical convalescence [11; 12]. At the same time at the systemic level the nature of activity of MMPs and TIMP at patients with a scleroderma remains almost not studied. It is possible to believe that specification of interrelation of factors of an extracellular matrix and TGF-β1 will help to deepen our ideas of a scleroderma pathogenesis, to define the corresponding tactics of the carried-out treatment of these patients.

The **purpose** of the this research was to carry out comparative assessment of maintenance of MMP-2, MMP-9 and MMP-7 and also their tissue inhibitors TIMP-1 and TIMP-2 in serum of blood of patients with a systemic and limited scleroderma.

Material and methods of a research

64 patients, including 29 (all women) patients of systemic (SSc) and 35 (26 women and 9 men) of patients with a limited scleroderma (LSc) and also 20 healthy donors similar to age are examined. Average age of patients was 55.3 ± 6.2 years, the average duration of a disease 13.5 ± 4.2 years. Included the analysis of the anamnesis and the objective inspection of patients including a complex of the standard clinical and laboratory methods in inspection (if necessary carried out ultrasonic diagnostics, reovasography, endoscopy, echocardioscopy, an ultrasonic duplex angioscanning). The diagnosis of SSc was verified with use of diagnostic signs, by N. G. Guseva's proposals [13; 14]. The chronic course of a disease took place at 20 (69%) patients, subacute – at 9 (31%). The moderate activity of inflammatory process is noted at 19 (65.5%) patients, minimum – at 10 (34.5%). Clinically SSc was characterized by a multiple syndromes with lesions of various organs, tissues and systems. LSc at all patients was presented by a blyashechny form, to inspissation stages at 16 [45; 7] patients, to atrophy stages – at 19 (54.3%). At clinical laboratory and tool inspection of sick LSc of signs of systemacity it wasn't taped.

Content of the researched extracellular matrix enzymes and concentration of TGF-β1 were determined by method of the solid-phase ELISA on the computerized microtablet reader of AT-858 (LTD, China). The MMPs and TIMP level was determined by standard sets for the ELISA: "Human/Mouse/Rat MMP-2 (total)", "Human/Mouse/Rat MMP-9 (total)", "Human MMP-7 (total)", "Human TIMP-1" and "Human TIMP-2" (Quantikine, ROSD Systems, USA), a TGF-β1 – by means of commercial test system (Bender MedSystems, Austria). Analyses were carried out in accordance to vendor's protocol. Concentration of probed indices in blood serum was expressed in nanograms per ml (ng/ml). Statistic data handling was executed on the program Statistica V.7 with determination of average arithmetical index (M) and its error (m). The reliability different was calculated on Student's t-criterion. Correlative communication was calculated according to Pearson (r). Distinctions read statistically authentic in case of significance value $p < 0,05$.

Results and discussion. The analysis of the received results of researches showed that at sick SC the level of activity of all studied MMPs (MMP-2, MMP-7, MMP-9) was significantly lower, and TIMP (TIMP-1 and TIMP-2) – above, than in control (tab). It is at the same time established what at sick SSc, is more expressed concentration of MMP-2, MMP-7 and MMP-9 – on 17.1 is reduced; 13.9 and 18,3% ($P < 0,05$), and the TIMP-1 and TIMP-2 level are increased for 18.2 and 19.5% ($P < 0,05$), in comparison with the data taped at patients with LSc.

Considering an important role of MMPs and TIMP in a regulation of process of a fibrogenesis, we studied the serumal maintenance of TGF-β1 – a key mediator of a fibrogenesis. It is noticed that TGF-β1 promotes the differentiation of miofibroblast and formation of a fibro-

genic phenotype of fibroblasts, regulates the production platelet a factor of body height (PDGF) stimulates synthesis of components of an extracellular matrix, including collagen and fibronectin [13]. It was established that at sick SC in a systemic blood flow TGF-β1 concentration was higher, than in control, including patients SSc groups 98,3% (P < 0,01), with LSc – for 17,1% (P < 0,05). At sick SSc the serumal TGF-β1 level was significantly higher, than at sick LSc for 18,1% (P < 0,05).

Table 1. – The maintenance of MMPs and TIMP of serum of blood at patients of the examined groups

The studied indicators, ng/ml	Control, n=20	Scleroderma	
		Systemic, n=29	Limited, n=35
MMP-2	203.62 ± 10.91	140.16 ± 7.71*	168.91 ± 6.92*
MMP-7	4.27 ± 0.15	3.12 ± 0.11*Δ	3.65 ± 0.11*
MMP-9	310.61 ± 14.95	212.81 ± 8.82*Δ	260.44 ± 10.68*
TIMP-1	296.54 ± 12.15	422.44 ± 13.51*Δ	357.32 ± 14.43*
TIMP-2	68.33 ± 3.17	92.73 ± 2.19*Δ	77.61 ± 2.02*
TGF-β_1	90.72 ± 4.35	125.42 ± 4.54*Δ	106.22 ± 3.72*

*Notes: * – P <0,05 in comparison with the control, Δ – P <0,05 in comparison with LSc.*

To assess the balance of proteolytic and antiproteolytic activity of serum enzymes in patients with different forms of scleroderma, we determined the index of the ratio of MMP-9/TIMP-1, MMP-2/TIMP-2, MMP-7/TIMP-1 and MMP-7/TIMP-2. It was found that the ratio of MMP-9/TIMP-1, MMP-2/TIMP-2, MMP-7/TIMP-1 and MMP-7/TIMP-2 was significantly lower in SSc group patients than in the control 52.4; 49.3; 71.4 and 45.9% (P < 0.001) respectively, and in patients with LSc – by 30.5; 26.8; 28.6 and 24.6% (P < 0.01), which indicates the dominance of the antiproteolytic activity of the MMP regulation enzymes. These processes are significantly higher in patients with SSc compared with those in patients with LSc at 31.5; 30.7% (P < 0.01), 60.0 (P < 0.001), and 28.3% (P < 0.01), respectively, of the observed MMPs/TIMP ratios.

At the same time, we tested the correlation analysis of the relationship between MMPs and TIMP parameters with TGF-β. In SSc patients, the TGF-β1 index had a strong feedback with MMP-2 (r = –0.83, P < 0.001), MMP-7 (r = –0.81, P <0.001) with MMP-9 (r = –0.85, P <0.001) and a direct strong association with TIMP-1 (r = 0.82, P < 0.001), TIMP-2 (r = 0.85; P < 0.001), and in patients with LSc, respectively: r = –0.78; –0.76; –0.79, and –0.77 and 0.76 (P < 0.01), i. e., a strong bond.

Thus, the study showed that in the systemic blood flow of patients with scleroderma, MMPs-MMP-2, MMP-9 and MMP-7 were lower in comparison with controls, against the background of high activity of their inhibitors TIMP-1 and TIMP- 2. Reduction of MMP in the circulating blood of patients with scleroderma is more evidence of inhibition of extracellular matrix remodeling processes, emphasizes the violation of the structural and functional integrity of the skin and the regulation of metabolic processes in the extracellular matrix. Apparently, this is objectively manifested due to their release into the systemic bloodstream. An important factor in reducing the level of MMPs is the activation of their inhibitors TIMP-1 and TIMP-2. It can be assumed that the imbalance in the MMPs/TIMP system is one of the mechanisms for the development of scleroderma. The degree of imbalance in the MMPs/TIMP balance seems to determine the form of scleroderma. In patients with SSc, the degree of MMPs/TIMP is more pronounced, in comparison with patients with LSc. It should be noted that the level of serum TGF-β1 influences the development of imbalance in the MMPs/TIMP system, as evidenced by its correlation with the MMPs/TIMP parameters. The increase in TGF-β1 is associated with a regular increase in the content of inhibitors of MMPs-TIMP-1 and TIMP-2, and inhibition of the activity of proteolysis enzymes-MMP-2, MMP-9 and MMP-7. The revealed disturbances in MMPs activity and their inhibitors can be used for theoretical explanation due to what other mechanisms the processes of fibrogenesis and the role of TGF-β1 in the regulation of the components of

extracellular matrix in patients depending on the form of scleroderma develop.

Conclusions: Consequently, the imbalance between MMPs and their inhibitors, as well as the expression of TGF-β1 in blood serum, play an important role in the breakdown of scleroderma. The degree of these disorders can be considered to determine the form of scleroderma, it helps to reduce the catabolism of the components of the extracellular matrix and creates a pathophysiological basis for enhancing sclerotic processes in the skin, which should be taken into account in clinical practice to develop a tactic for correcting existing disorders of extracellular matrix function in patients with scleroderma.

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FEATURES OF THE NEUROLOGICAL COURSE OF THE CERVICAL STENOSIS

Abstract: the scientific article presents the results of an analysis of the neurological signs and symptoms of 81 patients with diagnosis degenerative cervical spinal stenosis. Analysis of the results of the study showed that the clinical picture of degenerative cervical stenosis is variable and polymorphism of neurological syndromes is caused by a polyfactoral compression of the neurovascular formations of the vertebral canal. Neurological course of cervical stenosis is divided into four complex syndrome: radicular, spinal, radiculospinal and vascular.

Keywords: Degenerative cervical spinal stenosis.

Introduction

Spine degenerative stenosis is a set of clinical syndromes, arising from degenerative changes in the spine, leading to the narrowing of the spinal canal and compression of the neural and vascular structures [5].

According to the literature, combination of the progressive dystrophic changes in the intervertebral discs, joints and ligaments of the spine with the relatively small capacity of the spinal canal, due to innate or constitutional features of the spine (vertebral body and arch) is the most common cause of the spinal canal stenosis [1; 4; 5].

Stenosis is diagnosed according to the data of different authors in 5–65.2% of patients with long-standing degenerative processes of the spine. From this point of view, stenosis can be considered as one of the final stages of degenerative-dystrophic processes in the spine [1; 3; 4; 5].

The purpose of this study is to identify specific features of the cervical spine degenerative stenosis and to determine the main difference of stenosis from similar in clinical course diseases.

Materials and methods. This work is based on the data analysis from 81 patients with degenerative stenosis of the cervical spinal canal treated at the Scientific Center of Neurosurgery of the Ministry of Health of the Republic of Uzbekistan during the period from 2007 till 2011. All the patients underwent a complete clinical examination (general somatic status, orthopedic, neurological, X-ray, neurophysiologic investigation, computer- and magnetic resonance imaging). Patients were operated due to the spinal neurovascular compression secondary to stenosis. The diagnosis was verified at the surgery and confirmed by pathology. The sex distribution was as follows: men were 59 (72.8%), and women – 22 (27.2%). The age of the patients varied from 27 to 71 years.

Results and discussion. The main reason for the manifestation of the first neurological symptoms was physical overstrain of varying intensity. Physical load and lifting of weights, as the cause of the clinical picture, was diagnosed in 41 (50.6%) patients. From physical overstrain till the first symptoms appearance passed from several days to several months. Cold preceded development of clinical symptoms in 18 (22.2%) patients. In the remaining cases, patients were not able to determine the cause of the disease.

Analysis of the anamnesis data showed that in 32 (39.5%) patients numbness in the cervico-occipital region was the first manifestation of the disease. More often it localized initially either on the back of the neck, or in the distal parts of the hands. As a rule, weakness in the hands was attached to numbness in a short time (from one to three months). In 23 (28.4%) patients, the disease began with gradual development of weakness in the hands. At the initial stage, patients paid attention only to the "clumsiness" or "slackness" of one hand, mainly in the distal parts. In four cases, at the same time with weakness, small muscles hypotrophy developed first, first in one hand and then in the second. In one case, hand weakness combined with fascicular twitching in the thoracic muscles.

In 14 (17.3%) patients – weakness, "stiffness" in the legs and walking difficulty were the first signs of the disease. The clinical course of the degenerative stenosis is variable. 24 (29.6%) patients suffered pain in the cervical spine with painful restriction of mobility. Only in 16 (19.7%) cases, the radicular pain was pronounced and was the main factor for hospitalization. In 61 patients out of 81, which is 75.3%, the disease had a progressive course. In other patients, the disease progressed gradually. In 65 patients – neurology was manifested by compressive myelopathy in the form of motor and sensitive disorders of the neurological status. And only in 16 patients were diagnosed an isolated radiculopathy syndrome. Movement disorders were characterized mainly by tetraparesis in 28 (34.6%) patients, lower spastic paraparesis in 24 (29.6%) patients and isolated hands weakness in 13 (16%) patients, which was the most typical sign of radicular compression. The rude motor disorders were diagnosed in 4 patients in the form of the lower paraplegia. Motor disorders were accompanied with the hyperreflexia of the lower extremities in 52 (72.8%) patients and the appearance of pathological reflexes in 46 (69.1%) patients. Brown-Sekar syndrome of varying severity was revealed in 6 (7.4%) cases. Muscle jerking in the extremities and their atrophy were diagnosed in 11 and 12 cases, respectively. Explicit conductive sensitivity disorders were detected in the form of hypoesthesia in 46 (56.8%) cases. In all 16 patients with isolated radiculopathy, sensitive disorders were characterized by hypoesthesia in the corresponding dermatomes. In 27 (33.3%) patients, sensitive disorders were accompanied by paresthesia. Urination disturbances of the varying severity occurred in 17 (20.9%) cases. In two patients (2.4%), the neurological picture of compressive myelopathy was accompanied additionally by a vertebral artery syndrome. The Kimmerly anomaly was diagnosed on x-ray studies of these patients.

Establishment of a topical diagnosis by clinical data presents certain difficulties in patients with cervical myelopathy syndrome, because according to the results of studies, the tendency to a higher location of the myelopathic focus was confirmed with respect to the level of the location of the compressing factor. In a number of cases, according to the results of the neurological examination of the motor sphere, tendon reflexes of the upper extremities and sensitivity is a clear dissociation of neurological symptoms characterizing the upper level of the lesion. Sensitivity can serve as the most reliable topical criteria for the upper level of the lesion.

Analysis of neurological symptoms in patients with degenerative stenosis of the cervical spine allowed us to identify the following syndromes:

I. Lateral or radicular syndrome. This syndrome was diagnosed in 16 (19.7%) patients. In this case, structures of the intervertebral disc, osteophytes or hypertrophied articular surfaces compress the nerve roots. Pain appears in the lateral region of the neck, irradiates to the back of the neck or shoulder blade and is exacerbated by movements of the neck. Radicular pain and paresthesia in the upper limbs are the most constant symptoms of the lateral syndrome. Also radicular syndrome is characterized by weakness, fascicular twitching, muscle atrophy, weakening or absence of tendon reflexes, decrease in pain and temperature sensitivity.

II. Medial or spinal syndrome. This syndrome was identified in 38 (46.9%) patients. For this case, it is typical that patients have isolated myelopathy without radicular symptoms. Pain in the neck is diverse and most patients note some limitation of neck movements. Patients note a feeling of stiffness in the legs and a tendency to "foot -dragging" during the walk. Sometimes the gait is so difficult that the patient can hardly move his legs. Ataxic gait and paresthesia in the legs are also typical. Dysfunction of pelvic organs is absent at the early stages of spondylogenic myelopathy. Often upper limbs are affected with paresthesia, awkwardness, atrophy and loss of vibration sense. Examination of the patient reveals spasticity with the significant reflexes increase and the appearance pathological foot reflexes. Motor symptoms are usually asymmetric.

III. Combined medial-lateral (radicular-spinal) syndrome was diagnosed in 18 (22.2%) patients. Symptoms of the upper limbs roots lesion are combined with the symptoms of the pyramidal tract lesion from the lower extremities. Patients have radicular pain or paresthesia in the upper limbs, decrease of tendon reflexes from the biceps or triceps, inversion of the reflex or atrophy of the muscles innervated by C5-C7 segments.

IV. Vascular or ischemic syndrome. Syndrome of ischemic myelopathy was identified in 9 (11.1%) patients. Most often, ischemic myelopathy was manifested by the syndrome of ALS. Myelopathy with ALS syndrome was characterized by the combination of peripheral and central motor neuron dysfunction in the form of asymmetric

atrophy of the muscles of the shoulder girdle and hand with local fibrillation and pyramidal syndrome. Neurological examination reveals mixed paresis of the upper extremities in the combination with spastic lower paraparesis.

Taking in account that asymptomatic cervical spondylosis is a common cause of cervical myelopathy (12%), in reality it is caused more often by other reasons and are found later. Literature review and our own data showed that the clinical and neurological symptoms of the cervical spine stenosis can be polymorphic and can sometimes resemble demyelinating, inflammatory and neoplastic diseases [2].

Conclusion

1. Degenerative stenosis of the cervical spinal canal is characterized by variety of neurological syndromes. Variety of neurological syndromes in degenerative cervical stenosis is caused by a multiple factors of neurovascular compression in the vertebral canal.

2. Clinical and neurological changes in degenerative cervical stenosis occur in the form of radicular syndrome in 19.7% of cases, spinal cord syndrome –46.9%, radicular spinal syndrome in 22.2% cases and ischemic syndrome in 9 (11.1%) cases.

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COMPARATIVE CLINICAL STUDY OF HIV–INFECTED PATIENTS WITH HEROIN ADDICTION

Abstract: Psychopathological disorders in the withdrawal period of heroin addiction in HIV-infected patients are more severe than in non-infected patients. Heroin addicts with HIV infection are premature failures and relapses in post-abstinent period due to the difficult for correction of affective disorders.

Keywords: heroin addiction, HIV infection, withdrawal syndrome, affective disorders, relapse, remission.

Mental adaptation with the advent of tools that enable you to extend the life of HIV-infected patients has become a pressing issue [4, 887–891]. On average, 32% of HIV-infected patients have different psychopathological disorders [3, 968–973], including affective disorders.

Study and search of new approaches to the treatment of HIV-infected patients with heroin addiction is a problem of study of post-abstinent period to improve quality of life [1, 86–90; 2, 9–15].

The aim of the study was to identify clinical features in HIV-infected patients with heroin addiction in post-abstinent period.

Material and methods: 52 patients with heroin addiction (according to the criteria of ICD-10 – F. 11.3) were examined at the age from 25 to 40 years. All patients were divided into 2 groups. The main group is 35 heroin addicts with HIV infection and the comparison group is 17 patients with heroin addiction without HIV. The main methods of investigation were clinical-psychopathological, statistical. Clinical features of the disease in the 2 groups were assessed on scales of the dynamics of psychopathological disorders, common clinical impression (CGI), a modified rating scale of side effects UKU (UKU Side-Effect Rating Scale). Also conducted a quantitative assessment of relapses. Patients of two groups were homogeneous for age, sex and social security. The average age of patients in the main group amounted to 27.0 ± ± 4.4 years, in a comparative – 26.0 ± 3.1.

For statistical processing of material was used statistical analysis and information delivery SAS (Statistical Analysis System).

Results and discussion: The majority of patients in both groups had a high proportion of the social consequences of addictions: 80% in main and 83% in comparative groups, respectively. Personality changes according to the type of abuse was identified in 73.3% of patients of the main and 76% in the comparative group. In 67% of cases in main and 53% of patients in the comparative group had chronic somatic diseases that are caused by injecting drug use.

In hospital withdrawal syndrome proceeded with characteristic somatic vegetative, algic and psychopathological disorders. Thus in both groups the most frequently observed psychopathological disorders such as subdepressive, anxiety, dysphoria, irritability and explosive behavior. Only 8.7% patients of the main group the clinical picture of withdrawal symptoms to the forefront were algic disorders, while in the comparative group this form of abstinence syndrome were found significantly more often in 59.3% of patients. Withdrawal disorders with a prevalence of vegetative disorders were detected in single cases in both groups (Table 1).

From the first day of patient admission to the clinic, in the presence of clinical signs of the withdrawal syndrome was conducted therapy in accordance with the standards of treatment. Assessment of the pathological craving for the drug in dynamics is an important indicator of the effectiveness of therapy. The syndrome of pathological craving for drugs is inextricably linked to concomitant affective behavioral disorders. Not all symptoms included in the structure of pathological attraction to drugs used thus reducing the same. Dysphoria, emotional lability, sleep

disorders and behavioral disorders decreased significantly sooner in the group without HIV infection. So, emotional lability, sleep disturbances in the group without HIV infection tended to the relief already after 4 days of treatment, whereas in the group with HIV infection these parameters were changed no earlier than 14–20 days of therapy. Impact of treatment on affective symptoms (low mood) were identified in both groups, however, in the group without HIV infection significant improvement is noted with 10 to 14-th, and in the group with HIV infection from 16–18-day therapy. It should be noted that a significant clinical effect in the treatment group without HIV infection was observed already to 7–10-th day of its application. This relief of symptoms of abstinence syndrome greatly facilitated psychotherapeutic contact with patients and the treatment process as a whole.

Table 1. – Clinical manifestations and severity of withdrawal syndrome

The characteristic opioid withdrawal syndrome	**The group without HIV n = 17**		**The group with HIV n = 35**	
	abs.	**%**	**abs.**	**%**
With the prevalence of vegetative disorders	1	5.9	2	5.8
With the prevalence of pain disorders	10	59.3*	3	8.7
With the prevalence of psychopathological disorders	6	34.4	30	85.5*
Total	17	100	35	100

**significantly compared to control group ($p < 0,05$)*

In patients with HIV infection after 2–3 weeks of therapy on the background of the side effects (symptoms of neuroleptic syndrome – stiffness, restlessness, recurring anxiety) increased inactivity, apathy, lack of interest in surroundings, decreased activity. Whereas patients without HIV infection were more open, available for communication and psychotherapy, they are distinguished by high mobility, sociability, social activity, involvement in the life of the department.

The therapeutic efficacy of treatment in post-abstinent period and at the stage of forming remission was confirmed on a scale of overall clinical impressions. All patients without HIV infection, within 3 weeks the condition improved. While in 80% of cases the improvement was evaluated as "big", whereas in the group with HIV infection "a big improvement" identified slightly less often. In patients without HIV infection in 8% of cases there was a "very big" improvement. In the group of patients with HIV infection it was not such dynamics.

All the study (30 days) were 26 (86.7%) of patients without HIV and 23 (76.7%) of patients with HIV infection. In both groups there were patients who refused further treatment, was eliminated from the program early, despite active psychofarmakotherapy and psychotherapy. Refuse treatment was associated with aggravation of the attraction to drugs. 1 (5.9%) patients without HIV and 3 (8.6%) with HIV infection had left the program by the 20th day of the study. After 3 months the number of relapses in the main group consisted of 25 patients (71.4%) and in the comparative group – 9 patients (52.9%).

Table 2. – Comparative timing of relapses in patients

The timing of recurrence	**The group with HIV n = 35**		**The group without HIV n = 17**	
	abs.	**%**	**abs.**	**%**
After 20 days	3	8.6	1	5.9
After 1 month	5	14.3	3	17.6
After 2 months	6	17.1	2	11.8
After 3 months	11	31.4	3	17.6
Total	25	71.4*	9	52.9

**significantly compared to control group ($p < 0,05$)*

In general, in patients without HIV infection at all stages marked low severity of extrapyramidal side effects. Significantly less frequent than in patients without HIV infection met such undesirable phenomena as impaired concentration, weakness, drowsiness, impaired memory, anxiety, internal stress. All side effects in

patients without HIV infection compared to those in the group with HIV infection were mild, rapidly stopped by lowering the daily dose of the drug and, as a rule, did not require the appointment of corrective therapy. Patients with HIV infection took any discomfort in the body for signs of the manifestation of the disease and seriously responded to the survey, considering it proof of its occurrence. In these cases, was aggravated by the depressive and anxious feelings.

Conclusions

Thus, 85.5% of the heroin patients with HIV infection in the clinical picture of withdrawal symptoms to the forefront were psychopathological disorders, whereas in the comparative group, this form of withdrawal symptoms were found in only 34.4% of patients. In patients with heroin addiction with HIV infection in post-abstinent condition is the larger number of relapses than in patients without HIV infection.

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"MODERN OPPORTUNITIES IN TREATMENT OF TEENAGE GIRLS WITH RECURRENT UTERINE BLEEDINGS"

Abstract: in article there are considered questions of anti-recurrent therapy of uterine Bleedings at teenage girls. There were examined 60 patients – teenage girls – (middle age 14.2 ± 1.9). Risk factors of emergence and recurrence of uterine bleedings of pubertal period have been studied. There has been offered differentiated stage-by-stage approach to treatment of recurrent uterine bleedings at girls-teenagers.

Keywords: reproductive health of teenage girls, puberty, uterine bleedings of pubertal period, recurrence, vulvovaginitis, anemia, hypovitaminosis of B vitamins group.

A condition of reproductive health of modern population of teenage girls is characterized by high prevalence of gynecologic diseases, and there is defined negative tendency of their augmentation [3; 8]. Pubertal period is critical in formation of female reproductive system. A immaturity hypophysial-pituitary and ovarian system and reception of target organs to hormonal influences – are triggers of various disturbances in menstrual function at teenage girls. Most often these disturbances are expressed by uterine bleedings of pubertal age, that has significant effect on reproductive health of woman in fertile age. According to researchers, frequency of UBT (Uterus bleedings in teenagers) fluctuates from 19% to 38% and doesn't tend to depression. A main reason for their emergence is age incompetence of reproductive system of teenage girl. Burdened premorbidal background in combination with lability of neuroendocrinal regulation of menstrual function are starting moment in a pathogenesis of MKPP [1; 2; 3; 6; 7].

Etiological factors promoting emergence of UBT are multifactorial Most of researchers emphasize a significant role in genesis of UBT of bacterial and viral infection, hypovitaminosis, disturbances in system of hemostasis. Influencing to organism of teenage girl during hormonal reorganization, these factors (separately taken or in common) as a result lead to disturbance in metabolism of estrogens, emergence of condition of relative and/or absolute hyperestrogenemia [2; 3; 5; 8].

Due to above stated, pathogenetically justified integrated multisystem approach to treatment of UBT is expedient. At the same time, numerous methods for treatment of teenage girls being available today with UBT are imperfect, that is confirmed with high frequency of their recurrence (up to 41%). Therefore search by clinicians of optimum methods of treatment of the teenage girls suffering from UB is continued [4; 7; 8].

An objective of our research was optimization of tactics in maintaining teenage girls with recurrent UBT.

Material and methods of research. We have examined 60 girls – teenagers with UBT at the age of 13–16 years (middle age 14.2 ± 1.9) living in Tashkent city, not conducting sexual life during 2012–2016. For the first time disease (UBT) arose at 67% of examined teenage girls, in 33% cases there was noted a recurrence. According to that, examined teenage girls were divided into two comparative groups: 1st group – primary UBT (p = 40), 2nd group – UBT recurrence (p = 20).

As the important factor promoting emergence of UBT was somatic health of the child (rather its disturbance), we carried out an analysis of premorbidal background (PB) of the examined patients. The greatest burdening of premorbidal background gastrointestinal diseases is noted at 70% of examined patients, anemia of 1–2 degrees (59%), by pathology of a thyroid gland (54%), adenoid diseases and frequent ARD (acute respiratory disease) (36%), hypovitaminoses (especially group B vitamin) – 34%. At patients of the 1st PF group there was less burdened by above-mentioned somatopathies (to 30%) in comparison with patients of the 2nd group (54%).

Studying of a gynecologic case rate among examined patients has revealed inflammatory diseases of genitalias (vulvovaginitis, adnexitis) in 68% at patients of the 2nd group, 34% – at patients of the 1st group. Bacteriological studying of vaginal discharges defined mono causative agent only in 16%, in other 84% cases association of microorganisms with prevalence of Chlamydia and fungi and coccal (aerobic-anaerobic) flora is found. Biochemistry of a blood reflects anemia of 1–2 degrees at 59% of examined patients.

Heredity was burdened by various gynecologic diseases of mothers (myomas, cysts, DMK, sterility) also mainly at patients of the 2nd group (62%) while at patients the 1st group this indicator made 18%.

Results of researches: Analysis of etiological factors of UBT showed a necessity of integrated stage-by-stage differentiated approach to treatment. Patients of the 1st group received traditionally sexual steroids of hormonetherapy (KOK) originally with haemostatic purpose, then in a cyclic regimen for normalization of menstrual cycle of 3–6 months (ethenyloestradiolum + dezogestret). Starting dose of hemostasis depended on intensity of bleeding and patient's weight, having made from 2 to 4 tablets, with subsequent transition to a cyclic regimen. However, reception of hormonal drugs was followed by giddiness (32%), nausea and vomiting practically at every second patient. In this connection, parents of patients refused continuation of treatment with KOK that led further to recurrence of UBT.

Patients of the 2nd group with haemostatic purpose received medicinal preparations, corrective fibrinolysis, i. e. anti-inflammatory effect as inflammatory diseases of genitalias had high specific gravity having anti-fibrinolitic activity, and also rendering (to 68%). It is about the drug Yunimef-T, combining these effects at the expense of components – traneksame and mefename acids. Traneksame acid, being a fibrinolis inhibitor, has systemic haemostatic effect at bleedings, Mefename acid possesses nonsteroid anti-inflammatory effect, also promotes decrease of duration of bloody discharges at menstruation. Patients of 2nd group received drug on 2 tablets 3 times a day within 5 days. In none case there was noted a refusal of treatment due to bad tolerance of drug. Complex of treatment included also pathogenetically corrected purpose of drug of Normodoks as anemia and hypovitaminoses of vitamins of B group occurred at patients of the 2nd group in 59% and 34% respectively. Doksilamin succinate being a part of normodoks, blocks H1 – histaminic receptors, promoting to good acceptability of medicinal therapy, and pyridoxine (second component) participates in a metabolism, in particular amino acids (glutamic, ziztein, methionine and others), stimulates formation of erythrocytes. Drug was prescribed w for 1 tablet in day, reception duration – 1 month. Expressed positive effect is noted already with the following normal menstruation at 18 patients, lasting positive effect by 2–3 month of treatment. The post-treatment period at patients of the 1st group lasted 2–3 months while there was noted at patients of the 2nd group post-treatment to the following menstruation.

Conclusion. Uterine bleedings of pubertal period need to be considered as a multifactorial disease with predilection to a recurrence, therefore there is required differentiated and stage-by-stage approach to their treatment. Complex treatment of patients offered by us with UBT is pathogenetically justified as at the same time makes corrective impact on several etiological factors (inflammation, anemia, hypovitaminoses of vitamins of B group) that is pathogenetically justified and allows to optimize tactics of maintaining patients with UBT. Clinical laboratory researches have demonstrated that efficiency of UBT treatment offered by us made 82%, frequency of recurrence decreased twice, normalization of menstrual cycle is noted to the second month, lasting positive effect – also to the following menstruation that reduced treatment duration for twice. This pathogenetically justified treatment of UBT is not only anti-recurrence, but also keeping a regulation of reproductive system of teenage girl in the future.

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STATE OF GASTRIC MUCOUS BARRIER IN INDOMETACIN-INDUCED GASTROPATHY. EFFECTS OF USING INHIBITORS OF ANGIOTENSIN-CONVERTING ENZYME, OMEPRAZOLE AND MISOPROSTOL

Abstract: on experimental model of indometacin-induced gastropathy in rats with rheumatoid arthritis was studied effectiveness of peroral administration of enalapril at a dose 10 mg/kg, lysinopril – 8 mg/kg, captopril – 7,5 mg/kg, omeprazole – 50 mg/kg, misoprostol – 0,2 mg/kg during 10 days on content of fractions of insoluble glycoproteins in gastric mucosa.

It was established that damage of gastric mucosa in indometacin-induced gastropathy was characterized by reduction in composition of carbohydrate and protein fractions of glycoproteins. I-ACE – enalapril, lysinopril and captopril increase composition of glycoproteins in gastric mucosa. In this effect captopril excels enalapril and lysinopril. In its cytoprotective effect captopril equates to misoprostol.

Keywords: gastropathy, rheumatoid arthritis, I-ACE, omeprazole, misoprostol.

In the last decade a problem of NSAID-gastropathy takes an important place in treatment of rheumatologic patients. Search for new mechanisms of development of USAID-gastropathy and elaboration of new therapeutic drugs for treatment and prevention subject to data received are carried out [1]. At present for prevention and treatment of USAID-gastropathies are substantially used anti-secretory means and synthetic analogues of prostaglandins. But how shows practice preparations of these groups are scanty effective for prevention and treatment of USAID-gastropathies and are not suitable for prolonged use through their adverse effects.

To solve a problem of effective and safe prevention and treatment of USAID-gastropathies we consider reasonable to use inhibitors of angiotensin-converting enzyme (I-ACE). It is known that I-ACE has stimulating effect on synthesis of prostaglandins (PG-E2) in kidneys, vessels, and brain. It is assumed that they provoke an analogous effect in gastrointestinal tract. Studies of O. M. Mikheyeva et al. [2] serve this confirmation that established ulcer-healing effect of enalapril on hypertension patients with concomitant ulcer disease. As early as 2004 S. A. Alexeyenko et al. [3] noted improvement of clinical course of chronic gastritis in patients with arterial hypertension in treatment with enalapril and lysinopril.

Nafeeza Mohd Ismail et al. [4] on a model of aspirin-induced gastropathy in rats studied an effect of captopril and ranitidine on content of prostaglandin E2, malonic dialdehyde and on activity of glutathione reductase. It was established that captopril unlike ranitidine increases activity of glutathione reductase, content of prostaglandin E2 and reliably decreases content of malonic dialdehyde (MDA).

Aim of study. The given study was aimed at comparative research of effectiveness of omeprazole, enalapril, lysinopril, captopril and misoprostol on a state of gastric mucous barrier on a model of NSAID-gastropathy in rats with rheumatoid arthritis.

Materials and methods:

Experimental studies were carried out on 54 male rats of mixed population weighting 160–200g that were on habitual ration of vivarium. Animals were divided into the following groups:

1st group – intact; 2nd group – animas with experimental rheumatoid arthritis (ERA); 3rd group – animals with ERA and indometacin gastropathy (GERA); 4th group – GERA + distilled water during 10 days (group without treatment); 5th group – GERA + enalapril; 6th group – GERA + lysinopril; 7th group – GERA + captopril; 8th group – GERA + omeprazole; 9th group – GERA + misoprostol.

Experimental model of rheumatoid arthritis was induced by single administration of 0,2 ml Freund's adjuvant into hind right leg [8; 9]. Indometacin-induced gastropathy was caused by administration of indometacin water suspension at a dose 2,5 mg/kg per os during 5 days [5].

Preparations studying were administered as water suspension in the following doses: enalapril at a dose 10 mg/kg [6], lysinopril – 8 mg/kg [7], captopril – 7.5 mg/kg [8], omeprazole – 50 mg/kg, misoprostol – 0.2 mg/kg [9]. Selecting doses of the used preparations we have focused of the data of experimental studies carried out by other researchers on rats.

State of gastric mucous barrier was investigated by determination of composition of fractions of glycoproteins in suspension of gastric mucosa.

To perform biochemical studies animals have been decapitated by an one-stage in etherization, and recovered a stomach. Stomach was purified, irrigated with cold physiologic saline, proventriculus removed, mucous layer scraped out, weighted and suspended in physiologic salt solution at a rate of 30 mg/ml [10].

Composition of sialic acids in suspension was determined by a method of L. I. Linevik [11]. Results were expressed in mkg to ml of suspension.

To determine fucose in suspension of insoluble glycoprotein (IGP) was used a method proposed by P. D. Rabinovich et al. [12]. Results were expressed in mg to ml of suspension.

Content of protein was defined by O. H. Lowry et al. and expressed in mg to ml of suspension [13].

Data received were treated by using of Student's test by standard package Microsoft Excel.

Results and their discussion: Results of the studies conducted are given in the table.

Table 1. – Content of fractions of insoluble glycoproteins in gastric mucosa in indometacin-induced gastropathy in animals with experimental rheumatoid arthritis. Effects of using of I-ACE, omeprazole and misoprostol

№	Groups of animals	Sialic acids mkg in ml of suspension	Fucose Mg in ml of suspension	Whole protein mg in ml of suspension
1.	Control	4.12 ± 0.158	6.73 ± 0.125	15.22 ± 0.655
2.	ERA	3.84 ± 0.155	6.25 ± 0.153	14.72 ± 0.593
3.	GERA	1.22 ± 0.067	2.78 ± 0.100	7.65 ± 0.257
4.	GERA+H_20	1.38 ± 0.072	2.85 ± 0.121	8.55 ± 0.352
5.	GERA+enalapril	2.22 ± 0.047*	3.82 ± 0.089*	9.92 ± 0.400
6.	GERA+lysinopril	2.47 ± 0.085*	4.12 ± 0.051*	10.12 ± 0.397*
7.	GERA+captopril	3.27 ± 0.041*	4.82 ± 0.106*	11.75 ± 0.546*
8.	GERA+omeprazole	3.52 ± 0.089*	4.12 ± 0.076*	10.22 ± 0.343*
9.	GERA+misoprostol	3.92 ± 0.122*	5.32 ± 0.089*	12.32 ± 0.483*

*Note: * – P<0,05 from index of GERA group without treatment (GERA+H_20)*

How it is shown from the data presented a composition of fractions of insoluble glycoproteins in ERA was practically not changed.

Demonstrable reduction of fractions of insoluble glycoproteins was observed in animals with GERA. Content of sialic acids was lower than 69.5%, and that of fucose and protein – 55.5% and 48.1% respectively from indicator in group of animals with ERA (P < 0,001).

I-ACE, omeprazole and misoprostol had a positive effect on content of fractions of insoluble glycoproteins in gastric mucosa. An increase in composition of sialic acids by 60.8%, fucose – 34.5% and protein – 29.7% in

group treated with enalapril noted to be compared with group indices of animals with GERA without treatment. Nearly analogous results were observed in groups treated with lysinopril and omeprazole.

Application of captopril and misoprostol occurred to be more effective in treatment of GERA. In group of animals treated with captopril a content of sialic acids was increased by 136.2%, fucose – 69.7% and protein – 37.4% from indicators in group without treatment. In treatment with misoprostol a content of sialic acids was increased by 183.3%, fucose – 87.3% and protein – 44.1%.

It was established that sialic acids and fucose play a special role in full-grown functioning of glycoproteins. These carbohydrate components provide elasticity and viscosity of mucous barrier [14]. Results obtained in group of animals with GERA allow confirm that damage of mucous barrier was caused by decrease of glycoproteins' synthesis and its functional insufficiency characterized by changes in its rheological features. In the literature available a negative effect of indometacin on mucous barrier explains for inhibition of cyclooxygenase (COG) ferments, suppression of prostaglandins' production with the following microcirculation disturbance. It is supposed that this mechanism is not only one in this kind.

In the literature are available convincing data confirming an ulcer-healing effect of enalapril [15]. The authors unite this fact with stimulation of prostaglandins' synthesis. We assume that it is one of the mechanisms of positive effect of preparation that is consequence of correcting action of preparation on a system of NO-production. Mikheyeva O. M. et al. [2] in their clinico-experimental studies established an ulcer-healing effect of enalapril on defect of gastric mucous membrane in ulcer disease. The authors approve that this effect of enalapril is caused by improvement of microcirculation in gastric mucosa. Nikonov E. L. investigated effect of captopril and lysinopril on a state of gastric mucous membrane in patients with arterial hypertension and osteoarthritis over a long period of time taken NSAID [16]. The author established that I-ACE has positive effect on not only cardio-vascular system but also improve morpho-functional indicators of gastric mucous membrane. S. A. Alexeyenko et al. [3] confirm that mechanisms of positive effect of preparations of I-ACE group on gastric mucosa require the subsequent research.

Among the I-ACE used by us the best cytoprotective effect was observed in application of captopril. It is likely to cause by a presence of preparation of sulphhydrile group in chemical structure. How it is known a sulphhydrile group is necessary for prostanoids' synthesis and activation of prostaglandins' receptors, it effects on membranes' permeability and interconnects free radicals. These assertions confirm results of studies of Nafeeza MohdIsmail et al. [4].

Positive effect of omeprazole on synthesis of insoluble glycoproteins and a number of the functioning mucus-producing cells was established by us. In the literature are available contradictory assumptions about cytoprotective effect of omeprazole. Chandranath S. I. et al. [17] establish that inhibitors of proton pomp (IPP) have cytoprotective effect owing to suppression of acidic aggression and perhaps owing to other unknown mechanisms. Watanabe T. et al. [17] assume that protective action of IPP on gastric mucous tissue in its disturbance with ethanol is accomplished through regulation of production system of nitrogen oxide, and meanwhile a number of prostaglandins were not changed.

How Abdulkhakov R. A. established cytotek similarly to endogen prostaglandins has an ability to increase mucus production and secretion of bicarbonates, perfect blood flow, stimulate regeneration of epithelium of gastric mucous membrane, and decrease production of hydrochloric acid [18].

Conclusions

1. Damage of gastric mucosa in indometacin-induced gastropathy is characterized by decrease of content of carbohydrate and protein fractions of glycoproteins.

2. I-ACE – enalapril, lysinopril and captopril increase composition of glycoproteins in gastric mucosa. In this effect captopril excels enalapril and lysinopril.

3. In its cytoprotective effect captopril equates to misoprostol,

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EFFECT OF SOME ANGIOTENSIN-CONVERTING ENZYME (ACE) INHIBITORS, OMEPRAZOLE, CYTOTEK AND THEIR COMBINATIONS ON PROCESSES OF OXIDATIVE STRESS IN GASTRAL MUCOSA IN INDOMETACIN-INDUCED GASTROPATHY

Abstract: Effect of ACE inhibitors omeprazole and cytotek and their combinations on indices of oxidative stress and NO-formation in gastric mucosa was studied on a model of indometacin-induced gastropathy in rats with experimental rheumatoid arthritis. It was established that aggravation of processes of oxidative stress and reduction in composition of substrates and activity of NO-formation enzymes was one of the causes of injury of stomach with indometacin. Omeprazole, ACE inhibitors and cytotek correct processes disturbed in system of L-arginin-nitrogen oxide and have an antioxidant effect. Captopril and cytotek are most effective in such an effect. In treatment of indometacin-induced gastropathy combined application of omeprazole and ACE inhibitors with cytotek leads to pharmacodynamic reciprocal action as additive synergism.

Keywords: Angiotensin-converting enzyme (ACE) inhibitors (iACE), omeprazole, cytotek, oxidative stress, nitrogen oxide (NO), stomach.

Choice of preparation for treatment of gastropathies induced by non-steroid anti-inflammatory drugs (NSAID) in patients with rheumatologic diseases presents significant difficulties first of all because of necessity to conduct anti-ulcerous treatment in continuation of therapy with NSAIDs. NSAIDs cannot be withdrawn even temporarily in many patients admitted to a rheumatologic hospital because of aggravation of main disease, in determination of ulcers or erosions of the upper sections of gastro-intestinal tract because it can result in considerable worsening of a state and aggravation of articular syndrome [1]. Unfortunately, many questions of prophylaxis and effective treatment of NSAID-induced gastropathies are not consummated [2]. Limitedness of arsenal and an insufficient effectiveness, a high frequency of adverse effects of drugs used for treatment and prevention of NSAID-gastropathies exhibit a necessity to work out new effective drugs for treatment of NSAID gastropathies in patients with rheumatic diseases [3].

How it is known, a state of lipid peroxidation (LPO) and NO-formation in gastric mucosa is of no small importance in pathogenesis of NSAID-gastropathies [4]. Recently appeared new data that ACE inhibitors (iACE) have correcting effect on LPO and NO-formation processes in various organs [5]. This circumstance served a base for studying efficacy of some iACE in indometacin-induced gastropathy in animals.

The purpose of the study

Was comparative studying action of some iACE cytotek, omeprazole and their combinations on LPO and NO-formation processes in gastric mucosa in indometacin-induced gastropathy in animals with experimental rheumatoid arthritis.

Material and methods of research

Experimental studies were carried out on 78 male rats of mixed population with mass 160–200 g that received usual vivarium ration. Animals were distributed into 13 groups with 6 animals in each. The 1st group was intact, the 2nd one – animals with experimental rheumatoid arthritis (ERA), the 3rd one – animals with ERA and indometacin-induced gastropathy (GERA), the 4th one – GERA+H_2O (without treatment), the 5th one – GERA + enalapril, the 6th one – GERA + lysinopril, the 7th one – GERA + captopril, the 8th one – GERA + omeprazole, the

9th one – GERA + cytotek, the 10th one – GERA + omeprazole + enalapril, the 11th one – GERA + omeprazole + lysinopril, the 12th one – GERA + omeprazole + captopril, the 13th one – GERA + omeprazole + cytotek.

Rheumatoid arthritis was reproduced by a single administration of 0,2 ml Freund's adjuvant into posterior right leg [6]. Indometacin-induced gastropathy was provoked by oral administration of indometacin as water suspension at a dose 2.5 mg/kg during 5 days [7]. The used drugs were administered per os as water suspension during 10 days at the following doses: enalapril 10 mg/kg [8], lysinopril 8 mg/kg [9], captopril 7.5 mg/kg [10], omeprazole 50 mg/kg [11], cytotek 0.2 mg/kg [12]. In combined application drugs were administered in the same doses.

Results obtained were treated with using of Student's test by a standard package of Microsoft Excel. Differences considered valuable in $p < 0,05$.

Results and discussion

Table 1 presents results of studying effect of iACE, omeprazole and cytotek on indices of LPO in gastric mucosa in indometacin-induced gastropathy in animals with ERA. How it is seen from the table LPO indices in ERA were practically not changed.

Indometacin considerably accelerates processes of oxidative stress. Animals of this group had content of LPO, MDA and chemiluminescent (ChL) 130.4 and 179.0% respectively higher than control values. Activity of catalase was decreasing more than 2.5 times and SOD – more than 2 times.

Inhibitors of ACE omeprazole and cytotek had antioxidant effect on mucosal tissue of stomach. Composition of MDA was decreasing 38.5%, and ChL – 47.7% in animals with enalapril as compared with indices of the group with GERA+H_2O. Activity of catalase was increasing 79.0%, and SOD – 42.8%. Much the same antioxidant effect observed to be in rats treated with lysinopril. But more expressed effect noted to be in treatment with captopril. In this group content of MDA and ChL was decreasing 47.7 and 44.4% respectively, activity of catalase was increasing 103.0%, SOD – 66.7%. Antioxidant effect was also fixed in omeprazole therapy. In rats of this group content of LPO production and activity of AOS enzymes were reliably differed from those in a group without treatment. Antioxidant effect of cytotek was comparable with that in lysinopril group.

Table 1. – Indices of oxidative stress in gastric mucosa in indometacin gastropathy in animals with ERA

Group of animals	MDA, nmol/min/mg protein	ChL, imp/sec	Catalase, mcat/min/mg protein	SOD, CS/min/mg protein
Control	7.24 ± 0.329	139.8 ± 4.16	101.6 ± 2.95	351. 8 ± 7. 30
ERA	7.51 ± 0.322	135.7 ± 3.96	97.1 ± 2.94	345. 7 ± 7. 38
GERA	16.68 ± 0.550	390.1 ± 5.51	40.1 ± 1.69	165. 6 ± 4. 69
GERA + H_2O	15.52 ± 0.485	375.6 ± 5.98	39.6 ± 1.40	168. 5 ± 4. 08
GERA + enalapril	9.55 ± 0.345*	196.5 ± 4.40*	70.9 ± 2.99*	240. 7 ± 6. 06*
GERA + lysinopril	9.14 ± 0.294*	182.4 ± 3.91*	72.8 ± 2.41*	211. 5 ± 4. 66*
GERA + captopril	8.12 ± 0.322*	171.2 ± 4.58*	80.4 ± 2.81*	280. 9 ± 13. 38*
GERA + omeprazole	12.51 ± 0.454*	218.5 ± 6.92*	60.7 ± 1.98*	207. 3 ± 5. 21*
GERA + cytotek	8.98 ± 0.477*	190.8 ± 4.56*	71.3 ± 3.13*	220. 8 ± 4. 53*
GERA + omeprazole + enalapril	7.85 ± 0.282*	176.1 ± 4.40*	80.6 ± 3.03*	270. 6 ± 4. 89*
GERA + omeprazole + lysinopril	7.11 ± 0.241*	170.4 ± 3.56*	83.5 ± 3.17*	285. 4 ± 8. 05*
GERA + omeprazole + captopril	5.12 ± 0.193*	150.8 ± 3.20*	89.5 ± 3.19*	321. 3 ± 7. 29*
GERA + omeprazole + cytotek	6.08 ± 0.201*	147.3 ± 4.40*	93.7 ± 2.54*	315. 1 ± 6. 96*

Note: $p < 0,05$ as compared with indices of animals without treatment*

Antioxidant effect of combination of omeprazole and other drugs was potentiated. In group of omeprazole + enalapril composition of MDA and ChL was decreasing compared with a group without therapy 49.5% and 53.2% respectively. It was fixed also a more expressed increase in activity of catalase 103.5% and SOD 60.6%. In

group of omeprazole + lysinopril composition of MDA, ChL and activity of catalase were practically not differed from that in group of omeprazole + enalapril. Activity of SOD was only reliably high. Decrease in content of LPO products and increase in activity of AOS enzymes was significant in animals treated with omeprazole + captopril. The studying indices were reliably differed from control ones. Content of MDA and ChL was decreasing 67.1% and 59.9%, activity of catalase was increasing 126.0%, SOD – 90.7%. In group of omeprazole + cytotek composition of MDA and ChL was decreasing 60.9% and 60.8% respectively, and activity of catalase and SOD was increasing 136.6% and 87.0%.

Conclusion

1. One of the causes of injury of stomach with indometacin is intensification of processes of oxidative stress and reduction of content of substrate and activity of NO-formation enzymes.

2. Omeprazole, inhibitors of angiotensin-converting enzymes (ACE) and cytotek correct processes disordered in a system of L-arginin – nitrogen oxide and have an antioxidant effect. Captopril and cytotek are the most effective in this effect.

3. Combined application of omeprazole and ACE inhibitors and cytotek leads to pharmacodynamic reciprocal action as additive synergism in treatment of indometacin-induced gastropathy.

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SUPRAVESICAL OBSTRUCTION IN PREGNANCY: LITERATURE REVIEW

Abstract: Supravesical obstruction in pregnant women is considering as physiological condition. However, complicated supravesical obstruction in pregnant women is one of the most common urological disorders. Despite the progress in diagnosis and treatment in modern urology of pregnant women, there are still a number of questions in the management of these patients.

Keywords: supravesical obstruction, pregnancy, hydronephrosis.

Introduction

The supravesical obstruction during pregnancy considered as physiological phenomenon. The clinical significance lies in the possible association with the high incidence of symptomatic bacteriuria and ascending urinary tract infection, urolithiasis, ureteropelvic junction (UPJ) obstruction during pregnancy. In addition, this condition may be related to renal parenchymal involvement and hypertension and, further, be a possible cause of pain observed during pregnancy. However, the condition is frequently overlooked which happens more often now due to the increased use of ultrasonography, also performed subsequent further examinations (urinalyses, blood test, plain radiography, intravenous urography, MRI or CT scans, radioisotope renal scan) and treatments.

For these reasons, we have found it of interest to pay attention to the problem and survey the literature regarding complicated supravesical obstruction during pregnancy.

The occurrence of dilatation of the upper urinary tract in pregnancy has been recognized for over 200 years. Investigators described as, based on post-mortem examination of pregnant women, that the growing uterus by compressing the ureters produced retention of urine in the kidneys, dilatation of the ureters, pelvis and calyces and inflammation of these structures [1]. They also stated that it is obvious that the attacks of pain that occur during pregnancy sometimes result from renal infection, which would be diagnosed more frequently if its existence were recognized [2]. Pyelonephritis occurs more frequently in the second half of pregnancy than in the first, and that this probably results from the growing uterus compressing the ureters at the level of linea terminalis. The compression results in dilatation, vascular congestion and stasis, all of which increase the risk of ascending infection.

Incidence

Dilatation of the upper urinary tract was unusual and slight up until the 20th week of pregnancy. Shortly thereafter dilatation developed abruptly and remained, on the whole, unchanged with respect to grade and incidence, until term. During the latter half of pregnancy the right ureter and the pelvis were found to be dilated in 76, and the left ureter and pelvis in 36% [3]. Severe dilatation was rare, particularly on the left side. The dilatation ceases in all cases at the level of linea terminalis [4]. Other authors have made similar observations [5].

Employing isotope renography Fayad [6] et al and Nieminen et al [7] founds that renographic findings were normal during the first trimester, but that a progressive dilatation and delay in urinary excretion occurs during the following period. At term, abnormalities are seen in 70% on the right side and in 50% on the left side. Spencer et al in 2000, founds that MR excretory urography was a promising technique which affords equivalent functional and additional anatomical information to isotope renography and its more accurate then ultrasound assessment of supravesical obstruction [8].

Peak et al studied 204 patients, comprising 159 pregnant and 45 control subjects. Overall incidence of hydronephrosis found in 90% on the right side and 67% on the left side. Calyceal diameters for both kidneys were found to increase gradually throughout pregnancy, the right more rapidly than the left [4].

Grosjean et al has analyses the MRI of 100 asymptomatic pregnant women. He determined the number and locations of the uretero-hydronephroses and researched

whether there is any relationship between the uretero-hydronephrosis and certain abdominal structures. He focused on the psoas muscle, measured its depth, width and calculated its surface by a reproducible method. The analysis revealed that the uretero-hydronephrosis was predominantly at the right side (63%) and in the majority of the cases limited to the kidney (42%) and/or the proximal third of the ureter (42%) [9].

The study of supravesic obstruction in pregnant women showed that various diagnostic methods such as intravenous urography, MR excretory urography and ultrasound examination revealed ureteregronephrosis, with a higher frequency of occurrence on the right side, even in the absence of pain symptomatology.

Anatomical factors

Comprehensive anatomical and histological investigations of the ureters during pregnancy have been carried out and generally a varying grade of hyperplasia of the periureteral connective tissue, hypertrophy of the ureteral smooth muscle, oedema and increased vascularity were found; the same picture was shown by the genital tract during pregnancy. The most prominent aspect was the hypertrophy of the external longitudinal muscle layer surrounding the distal part of the ureter. It was suggested that this hypestrophy could result in stricture, which would then explain the dilatation [10–12]. The dilatation would have to begin just above the urinary bladder and not first at a level with the linea terminalis, and should also be equally pronounced on both sides.

Hormonal factors

Due to the common embryological origin of the urinary and genital tract, many investigators have thought that they could demonstrate that the hormonal effect which during pregnancy results in a physiological relaxation of the genitals would also result in pathological dilatation of the urinary tract [13–16].

Marchant found that medroxyprogesterone hormone did not result in changes in ureteral activity nor dilation _ENREF_17 [17].

Obstruction

Many similar observation reported supravesical obstruction more marked on the right side. They concluded that dilatation was caused by the pressure of the uterus on the ureters, where these crossed the iliac vessels at the level of linea terminalis, and that the difference in sides resulted from the different courses of the iliac vessels in relation to the ureters on the two sides [18–20].

Harrow et al. considered that dilatation resulted entirely from compression, and based this on data from intravenous urographies. Using urography on non-pregnant women, hydronephrosis occurs after a few minutes of external compression, and disappears immediately following decompression. In the pregnant woman the dilatation rapidly reduced following decompression by means of a change in position to lying on the side or knee-elbow position; similarly the pain brought about by the dilatation is relieved. The difference in side with respect to the extent of dilatation results from the protective effect of the sigmoid lying above the left ureter. In post-partum patients, the hydronephrosis decreased rapidly. Complete restitution could be seen by 24 h after delivery [21].

Shokeir et al. in his study investigate renal resistive index (RI) in the identification of acute renal obstruction in pregnant women. The study included 22 pregnant women with acute unilateral ureteral obstruction due to a stone disease, 71 normotensive pregnant patients without any pain, and 20 nonpregnant women with normal both kidneys. All patients performed dopler ultrasound examination to calculate RI on kidney with supravesical obstruction and DeltaRI on contralateral kidney. The RI was sensitivity was 45%, specificity 91%, and accuracy was 87%. The corresponding values for DeltaRI were 95%, 100%, and 99%. In acute unilateral ureteral obstruction in pregnant women, the DeltaRI is more sensitive and specific than RI exam, and DeltaRI can used instead of intravenous urography [22].

Reynolds et al. based on an investigation of 130 pregnant women, that the difference in side in combination with the dilatation of left ovarian vein, which occurs in connection with pregnancy, was the cause of the high incidence of right-sided hydronephrosis and pyelonephritis during pregnancy [23].

Kalaitzis et al. determined on his study treatment modalities of symptomatic ovarian vein syndrome in pregnancy. Twelve pregnant women with right ureter and kidney dilatation caused by ureteric obstruction were included to study. For 11 patients performed insertion of Double J stent and for one patient was performed percutaneous nephrostomy. After insertion of Double J stents, respective percutaneous nephrostomy colic attacks went back immediately. Ovarian vein syndrome in

pregnancy can lead supravesical obstruction with colic pain and can become complicated by pyelonephritis. In these cases insertion of a Double J stent or percutaneous nephrostomy is safe and leads to an improvement of complaints immediately [24].

Compression by the uterus can result in acute attacks of pain triggered by acute ureteral obstruction and the obstruction with it the pain can be relieved by a change in position to knee-elbow position [25; 26].

Renal colic is the most frequent non-obstetric cause for abdominal pain and subsequent hospitalization during pregnancy. Ultrasound examination is widely used as the first-line diagnostic test in pregnant women with nephrolithiasis, but and it may be unable to differentiate between ureteral obstruction secondary to calculi and physiologic hydronephrosis [27]. Magnetic resonance imaging (MRI) should be considered as a second-line test, when US fails to establish a diagnosis [28]. Moreover, MRI is able to differentiate physiologic from pathologic dilatation. In the cases of obstruction caused by calculi, there is renal enlargement and perinephric edema, not seen in physiological dilatation. MRI is also helpful to determine complications such as acute complicated pyelonephritis [29, 30]. In unclear situation, Computed tomography is a reliable technique for determining obstruction of urinary tract calculi in pregnant women, and it performed only by indications, because of involves ionizing radiation [31].

Clinical significance

The physiologically asymptomatic supravesical obstruction during pregnancy is, in itself, of no clinical importance, if infection does not occur and that the ureters do not fully blocked.

Pregnant women have an increased morbidity and mortality for UTI owing to the physiologic and immunologic changes in pregnancy. Urinary tract infections are common during pregnancy. The incidence of asymptomatic bacteriuria is on the whole the same in pregnant as in non-pregnant women, 2–10%, whereas the incidence of symptomatic bacteriuria is 3-fold higher in pregnant women, 15% against 5% in non-pregnant women, and the incidence of infection with symptoms in pregnant women with bacteriuria is 30% against 1% in pregnant women without bacteriuria. Infection producing symptoms has, in addition, a considerably greater risk of causing ascending infection during pregnancy [32]. Acute pyelonephritis occurs in 20% in cases of non-treated bacteriuria, against 2% in those without bacteriuria, and the course is often more serious in pregnant than in non-pregnant women. Ten percent of patients with pyelonephritis develop septicaemia, and 3% septic shock [33].

Easter on her study, hypothesize that urinary tract infection increasing risk of preeclampsia. Study included 129 women with UTI and 235 patients with preeclampsia. Patients with UTI in pregnancy had higher rates of preeclampsia (31.1% vs 7.8%, $P < 0.001$) compared to those without UTI. UTI in pregnancy is strongly associated with preeclampsia. Prophylaxis against UTI represents to slow or halt the development of preeclampsia [34].

As we have observed hydronephrosis and hydroureters, with partial or intermittent obstruction, can be the cause of a number of cases of uncertain abdominal, flank or low back pain, as seen during pregnancy, and which is often of a transient nature provided changes in position occur, which is often the case following hospitalization.

During pregnancy, urolithiasis is a challenge for physician. It requires management of renal colic, infection and renal failure [35]. In cases not effectiveness of conservative treatment requires insertion of a double-J or pigtail catheter [35; 36], performing percutaneous nephrostomy [24; 37] and possibly retention of the catheter until labor has been effective in those cases where it has been attempted. Early intervention in order to derivation of supravesical obstruction must carried out before chronic renal damage occurs [37]. Normal renal function shortly before labor or shortly after achieved in all the reported cases.

Conclusion

Dilatation of the upper urinary tract must seen as a physiological condition during pregnancy. This condition found in almost all pregnant women, most frequently and most pronounced in women pregnant for the first time. It develops quite abruptly around the 20th week of gestation, and is more prominent on the right side where the ureter, due to its course in relation to the iliac vessels, most exposed to compression and it progresses slowly until labor. The dilatation disappears rapidly after birth and has disappeared in 75% a month post-partum. The dilatation includes the renal pelvis and ureters down to a level with the linea terminalis. Dilatation not seen in pregnant women with pelvic kidney.

Peristaltic activity in the ureter is normal during pregnancy and not affected by hormones in physiological

doses. Intraureteral pressure increased above the linea terminalis, and pressure rapidly returns to normal after delivery, indicating obstruction as the most important factor.

The pregnant uterus compresses the ureters, and thus is the only cause of physiological hydronephrosis during pregnancy. Acute hydronephrosis due to complete or intermittent ureteral occlusion not diagnosed fully in all, probably due to lack of attention. Ultrasonography, CT and MRI of the upper urinary tract should performed in cases of uncertain abdominal or flank pain during pregnancy. The treatment will primarily be improvement in drainage by means of positioning of the pregnant woman on the least-affected side or intermittent knee-elbow position. In cases of persistent severe pain or affected renal function, ureteral stones, alleviation must attempted by the insertion of a DJ stent or perform percutaneous nephrostomy.

UTIs should be adequate and aggressively treated during pregnancy with providing adequate drainage.

Consideration should give to the question whether women with a single kidney obstruction prior to pregnancy, should be subject to monitoring more frequently during pregnancy, performing ultrasonography, CT or MRI, renal function tests and urine cultures.

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MRT FEATURES OF THE ARTICULAR SURFACE OF THE FEMUR IN OSTEOARTHROSIS OF THE KNEE JOINT

Abstract:

Goal: To study the importance of the results of MRI studies for the correct formation of a clinical diagnosis and choice the tactics for the treatment of arthrosis of the knee joint.

Methods and materials: In the research, 80 patients with a diagnosis of knee osteoartritis (OA) were examined. The age of the patients was from 18 to 75 years. Of the 80 patients, 47 (58.75%) were women and 33 were men (41.25%). In all 80 patients, the MRI scan was performed. The role of degenerative changes center on the articular surfaces of the femur in the MRI examinations was studied by using Cahill – Berg and Harding classifications.

Results: In the results, according to the Cahill – Berg's classification, pathological outbreak located in 56 patients (70%) in the external medial condylus, in 24 patients (30%) in the internal medial condylus. In 6 patients (7.5%) OA identified in the lateral and medial condylus. According to the Harding OA located in 2 patients (2.5%) – A area, in 16 patients (6.25%) – A and B, in 29 patients (48.75%) – B, in 19 patients (21.25%) – B and C, and in 14 patients (18.75%) – C area.

Conclusion: In main group of patients with knee joint osteoarthrosis in MRI imaging identified early stages of the damage of joint cartilage. In all patients the outbreaks of OA located on the knee surface of femur, possibility to study their features in all positions may help to put correct diagnosis.

Keywords: Knee joint, osteoarthritis, magnetic resonance tomography, diagnosis.

Introduction

The widespread use of magnetic resonance imaging in practice, like noninvasive method, helps to assess the changes in cartilage, under cartilage tissue and bone of the knee joint [1; 2]. In modern orthopedics, early diagnosis of osteoarthritis became available with magnetic resonance imaging. At the same time, it became possible to analyze changes in joints after surgical intervention and to study the effectiveness of the procedures performed [3; 4]. MRI helps to detect early changes not only in ligaments, tendons and muscles, also allows diagnosing and determining treatment tactics in the early stages by studying the size, properties and location of hyaline cartilage defects in osteoarthritis of the knee joint [5; 6].

Purpose

To study the importance the results of MRI for the correct formation of a clinical diagnosis and choice the tactics for the treatment of arthrosis of the knee joint.

Methods and materials

In the research, 80 patients with a diagnosis of knee OA were examined. Of these, 40 patients were treated at the Barunsang Hospital of the Republic of Korea between 2012 and 2015, and 40 patients were treated at the Department of Traumatology and Orthopedics of the Republican Clinical Hospital No. 1 of the Ministry of Health of the Republic of Uzbekistan from 2016 to 2017.

The age of the patients was from 18 to 75 years. Of the 80 patients, 47 (58.75%) were women and 33 were men (41.25%). In all 80 patients, the MRI scan was performed in devices MAGNETOM Area – Siemens 1.5T (Germany) and SIGNA Explorer – General Electrics 1.5T (USA). During the examination, the knee joint was fixed with a flexion up to 5 degree and with the possibility of rotation around the free axis of the legs up to 15 degree and the internal rotation did not exceed 5 degree and the external rotation was 10 degree. The images were taken with cuts of 3 to 4 mm in standard sizes of

axial and coronal T1WI, T2WI, sagittal T1WI and T2BI cuts. The role of degenerative changes center on the articular surfaces of the femur in the MRI examinations was studied by using Cahill – Berg and Harding classifications (Diagram 1).

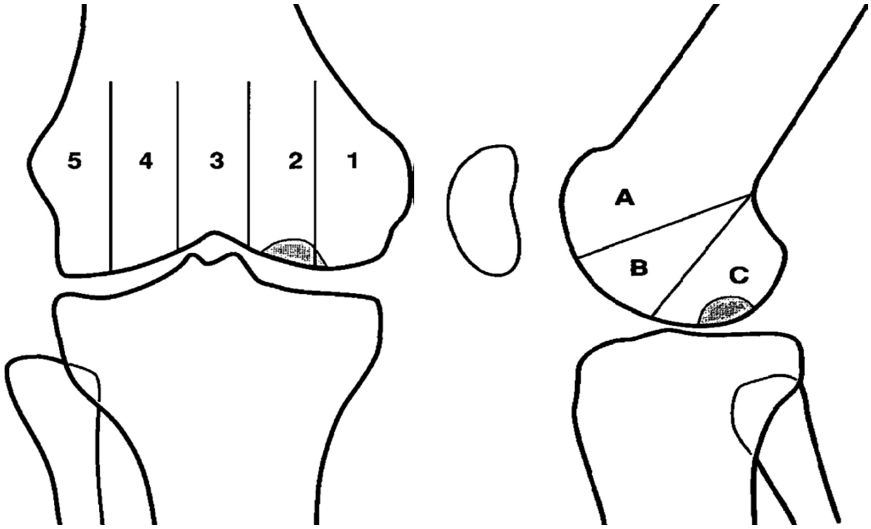


Diagram 1. Classification of Cahill-Berg and Harding for the definition of the OA outbreak of the knee joint. Cahill – Berg classification: 1 – medial condylus outer area, 2 – medial condylus internal area, 3 – femoral incision, 4 – medial area of lateral condylus and 5 – lateral area of lateral condylus. Harding classification: The A – Blumensaat line (the figure above the upper backside of the intercondylar carcase image) corresponds to the lower area of the knee lid, B – A and C spheres, C – Tangential line from the posterior cortex of the femoral diaphysis to the knee joint

The features of outbreaks of knee joint osteoarthrosis, its volume, depth of damage, MRI stages and other changes justified by the P. A. Lotke and M. L. Ecker's classification which is recommended in 1985. According to this classification in the 1st stage in T2W1 view damaged area is intensified and in T1W1 low intensity. In the 2nd stage in T1W1 limited low intensity damaged area, in the 3rd stage the damaged area intensity is decreased than the moderate intensity, in the 4th stage in both T1 and T2W1 views damaged area is in low limited intensity and in the 5th stage there severe low intensity in damaged area and narrowed joint range [7; 8].

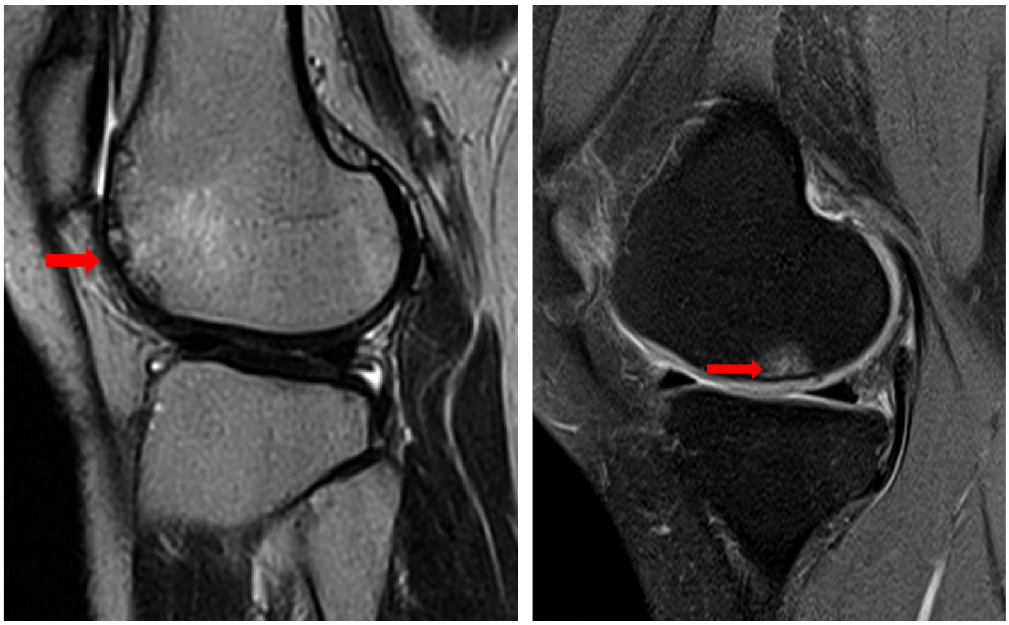
Results and discussions

Through the MRI investigation for knowing more information about disease and planning surgical treatment by the classification of P. A. Lotke and M. L. Ecker, in the main group of patients identified depletion of cartilage and subchondral tissue of the medial tibiofemoral joint surface of knee joint (Table 1).

Table 1. – Distribution of patients by stages of MRI classification P. A. Lotke and M. L. Ecker

MRI stages	Patients number	Percent
Stage – 1	24	30
Stage – 2	27	33.75
Stage – 3	17	21.25
Stage – 4	12	15
Total	80	100

In the MRI investigations identified wound and degenerative changes in 51 patients (63.75%) internal, in 7 patients (5.6%) both meniscus and in 10 patients (12.5%) only external meniscus. The damage of adjacent joint cartilage of damaged meniscus occurred in 57 patients (71.25%). In 11 patients (13.75%) identified intraarticular foreign body, in 7 patients (8.75%) partial rupture of crossing ligament and in 8 patients (10%) Becker's cyst.



Picture 1. Location of osteoarthritis zones in 1 A and 2 C by Harding

In the results, according to the Cahill – Berg's classification, pathological outbreak located in 56 patients (70%) in the external medial condylus, in 24 patients (30%) in the internal medial condylus. In 6 patients (7.5%) OA identified in the lateral and medial condylus. According to the Harding OA located in 2 patients (2.5%) – A area, in 16 patients (6.25%) – A and B, in 29 patients (48.75%) – B, in 19 patients (21.25%) – B and C, and in 14 patients (18.75%) – C area (Picture 1).

The results of MRI investigation showed that in the patients with knee OA pathological process located more on the medial joint surface. Permanent impact of damaged meniscus to the joint surface called degenerative and destructive changes. In all patients identified degenerative changes on the femoral condylus surface of knee joint in MRI investigation. In 45 patients (56.25%) pathological process located on the tibial joint surface and in 7 patient (5%) on the patellar joint surface (2-diagram).

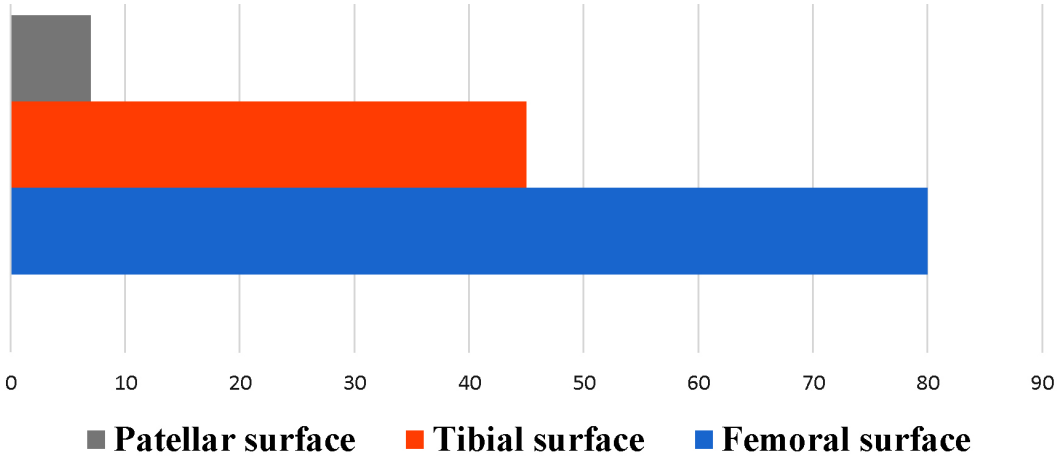


Diagram 2. Distribution outbreak of osteoarthritis on the articular surface

Conclusion

In main group of patients with knee joint osteoarthrosis in MRI imaging identified early stages of the damage of joint cartilage.

In all patients the outbreaks of OA located on the knee surface of femur, possibility to study their features in all positions may help to put correct diagnosis.

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OUR EXPERIENCE IN TREATING PATIENTS WITH SPINAL HYDATID CYSTS

Abstract: The Purpose is to analyze the patients who has tumors of the spine in the thoracic and lumbar spine and present the results of surgical treatment. The results of the research and treatment of 51 patients with tumours of the spine, conducted between 2009 and 2011. We studied the intensity of pain (VAS), a neurological condition (scale ASIA), and radiographic parameters which characterizing the degree of deformation of the spinal column. The Results. Excellent result of treatment (group A) was observed in 14 (27%) patients. Good (group B) and satisfactory (Group C) results of treatment are marked in 9 (19%) and 14 (27%) patients respectively. In 14 (27%) patients received poor treatment outcomes (group D). In this group died 2 (4%) patients. The Analysis of neurological disorders in groups A and B on the lower extremities showed improvement (on average) to 1.04 ± 0.56 degree scale ASIA/IMSOP. Regression of neurological disorders occurred in all 11 patients with primary tumours of the spine. Marked decrease in pain (on average) to 3.17 ± 1.07 degrees in VAS. In A and C groups, decrease in the angle of local kyphosis was (on average) 10.91 ± 6.44. The best results were observed in vertebral compression index (9.45% ± 8.50%), than in vertebral strain wedge index (6.55% ± 9.86%).

Conclusion. The Operation of posterolateral approach with the stabilization of the spine improved neurological status and/or local kyphosis angle for tumours to 73% of cases. In remote control studies there have been documented good treatment results in 27% of patients with tumours of the spine.

Keywords: spinal tumors, posterolateral surgical approach.

Introduction. Echinococcosis in humans is severe parasitic disease that is widespread in many regions of the Republic of Uzbekistan. Among rare forms of echinococcus diseases damage by echinococcus cyst of the spine and neurovascular structures of spinal canal (spinal cord, its vessels and roots) is the most severe. Both hematogenic invasion and cystic invasion from adjacent formations through intervertebral foramen can be the reasons for spinal canal echinococcosis development. Following to data of the researchers handling with echinococcosis problem, parasite localization in spinal canal is occurred in 0.4–1% of patients [1; 2]. Literature analysis suggests that such observations are generally reported as case histories and are based on few number of patients (from 1 to 3 cases by each author) [3].

Research objective is to analyze patients with echinococcosis of the spine in the thoracic and lumbar spine and study the results of surgical treatment.

Materials and research methods

Material for this work is the results of researches and treatment of 26 patients with echinococcosis of the spine, which were carried out within the period from 2010 to 2014 in a clinic of the Republican Scientific-Research Centre of Neurosurgery of the Ministry of Health of the Republic of Uzbekistan. Patients' age varied from 14 to 55 years old; of which there were 18 man and 8 women. Average age of patients was 36 years old.

All patients have passed complete clinical research. The diagnosis was verified during operation and was confirmed hystologically. Pain syndrome intensity was assessed according to visual analogue scale (VAS). ASIA/IMSOP

scale was used in order to characterize neurological status. Damage of spinal column was assessed by X-ray research methods: direct radiography, computed tomography (CT), magnetic resonance imaging (MRI). Vertebral compression factor (VCF) and vertebral wedge-shaped deformation factor (VWDF) were used for the purpose of objectivization of extent of damage. VCF assesses the loss level of anterior height of damaged vertebral body in relation to anterior body height of two adjacent vertebrae. VWDF indicates the value of vertebral body reduction resulted from wedge-shaped deformation. Deformation of spinal axis was assessed based on angle measurement of local kyphosis (Cobb) and anterior displacement of vertebrae. Amount of spinal canal narrowing was also taken into account based on the data of computed tomography (CT) and magnetic-resonance (MR) researches. The condition for selection to surgical treatment was the lack of damage of brain and lungs by echinococcosis. Surgical treatment supposed decompression of spinal cord at the level of damage from posterolateral approach with removal of echinococcus cysts, removal of chitinous covers, and partial resection of damaged body. The operation was completed by transpedicular stabilization with drainage tube being left, by which flushing of epidural cavity was carried out within 3–4 days using 15% sodium chloride solution. During preoperative and postoperative period the patients were subjected to chemotherapy by antiparasitic drugs.

Results. Echinococcus cysts localization by regions of the spine was as follows: thoracic spine – 9 (35%); lumbar spine – 17 (65%). Out of 26 patients, 16 (61.5%) had recurrent echinococcosis, 10 (38.5%) patients have sought medical advice for the first time.

Neurological manifestations measured by ASIA-IMSOP scale were presented as follows. Number of patients referred to A group was 2 (7.7%), B group – 4 (15.4%), C group – 7 (27%), D group – 9 (34.5%), E group – 4 (15.4%). Therefore, total number of patients with compressive myelopathy syndrome (A, B, C groups) amounted to 13 (50%) patients. The same number of patients had disc syndrome (D, E groups).

The patients were distributed by pain syndrome intensity (VAS scale) as follows. 2 (7.7%) patients with thoracic spine echinococcosis and 6 (23%) patients with lumbar spine echinococcosis were complained of minor pain (3–4 scores). 5 (19.2%) and 8 (30.8%) patients, respectively, were complained of moderate pain (5–7 scores). 2 (7.7%) patients with thoracic spine echinococcosis and 3 (11.5%) with lumbar spine echinococcosis were complained of severe pain (8 scores and more).

Assessment of spinal injury based on radiological examinations is presented in Table 1. Mean values were as follows: VWDF – 19.26% ± 15.34%, VCF – 24.57% ± 18.34%, spinal canal narrowing – 32.25% ± ± 17.33%. Mean value of local kyphosis angle amounted to 14.06 ± 13.44. II degree (65.3% patients) predominated during assessment of spinal column injury. Changes referred to I degree were observed in 34.7% of patients. During assessment according to vertebra destruction scale, changes of the 1st degree (12 patients – 46.2%) occurred most often. Changes of the 2nd degree were observed in 9 (34.6%) patients. 5 (19.2%) patients were referred to the 3rd degree.

Table 1. – Assessment of the spine damages based on X-ray studies

Indicators	Values
VWDF (n = 26) interval from 0% to 55%	19.26% ± 15.34%
VCF (n = 26) interval from 0% to 80%	24.57% ± 18.34%
Spinal canal narrowing (n = 26) interval from 12% to 80%	32.25% ± 17.33%
Angle of local kyphosis (n = 26) interval from 14 to 39	14.06 ± 13.44
Number of damaged spinal columns (degrees) I – two II – three	(n = 26) 9 (34.7%) 17 (65.3%)
Spine deformation scale (degree) 1 – compression fracture 2 – fracture with predominant compression 3 – fracture with predominant wedge-shaped deformation	(n = 26) 12 (46.2%) 9 (34.6%) 5 (19.2%)

Magnetic resonance assessment of the spine that was made to all 26 patients has found compression of neurological manifestations of spinal canal, and in 19 (73%) cases – appropriate compressions of signal intensity change (under T_1 and T_2) in spinal cord.

Types of posterolateral surgical approach are presented in (Table 2). The 1st and the 2nd economic approaches were performed in 6 (23%) cases. The 3rd and the 4th broad surgical approaches were performed in 20 (77%) cases. Operation with bilateral decompression of vessels and nervous formations of spinal canal was performed in 19 (73%), and with unilateral one – in 7 (27%) patients.

Table 2. – Type of surgical approach

№	Type of surgical approach	Number of cases (n = 26)
1.	Resection of vertebral arch, arch root, and upper intervertebral joint	2 (7.7%)
2.	Resection of vertebral arch, arch root, and upper/lower intervertebral joints	4 (15.4%)
3.	Hemilaminectomy or laminectomy, removal of arch root, articular processes and transverse process in lumbar spine	16 (69.1%)
4.	as in item 3+ removal of costotransverse joint, head and part of rib in thoracic spine	4 (7.7%)

Broad surgical approach was used more often both in thoracic spine (73% cases) and lumbar spine (62% cases).

In hystologic studies, echinococcus vesicles and chitinous covers were verified in all cases.

Stablization of the spine from a perspective of vertebrae injury is presented in Table 3. Transpedicular stabilization was performed in 12 (46.2%) patients. As for the rest 14 (53.8%) patients, they were not subjected to stabilization and metal implants were not applied to them. Short stabilization (3 segments) was used in 10 (83.3%) cases. Long stabilization (4 segments) was performed in thoracic spine in 2 (16.7%) patients.

Table 3. – Stabilization of the spine

Stabilization	Number of cases n = 26	Extent of the spine damage	
		Th3-Th12	L1-L4
Type			
Transpedicular	12 (46.2%)	3	9
Without stabilization	14 (53.8%)	6	8
Number of stabilized segments	n = 12		
3	10 (83.3%)	2	8
4	2 (16.7%)	2	0

Table 4. – Early treatment results

Results	Number of cases (n = 26)
A – good	17 (65%)
B – satisfactory	8 (31%)
C – poor	1 (4%)
Improvement	
By ASIA/IMSOP scale (degrees)+	1.46 ± 0.77
By VAS scale (scores)+	4.35 ± 1.33
Local kyphosis angle++	11.87 ± 7.12
VWDF++	7.55% ± 8.86%
VCF++	9.45% ± 8.50%

+ *refers to results in A and B groups*

++*refers to results in A and C groups*

Early treatment result is presented in (Table 4). Good treatment result (A group) was observed in 17 (65.4%) patients. Satisfactory (B group) treatment result was observed in 8 (30.8%) patients. In 1 (3.8%) case poor treatment result (C group) was obtained. Mild paraplegia has developed in the patient after operation. Analysis of neurological disorders in A and B groups by function of lower extremities indicated the improvement (on average) to 1.46±0.77 degree by ASIA/IMSOP scale. Regress of neurological disorders occurred in all 25 patients. Reduction of pain syndrome was observed (on average) to 4.35±1.33 degree by VAS scale. Reduction of angle of local kyphosis in A and C groups amounted to (on average) 11.87˚±7.12˚. Best results were observed in VCF (9.45%±8.50%) than in VWDF (7.55% ±8.86%).

Control studies were carried out in 11 (35%) patients (Table 5). Late good treatment result was observed in 8 (81.8%) cases, poor one – in 3 (18.2%) cases. Improvement by ASIA/IMSOP scale, on average, amounted to 0.21±0.43 degree, and by VAS scale – 0.34±0.52 degree. Deterioration of neurological status by ASIA/IMSOP scale, on average, amounted to 0.25±1.71 degree, and by VAS scale – 0.43±0.57 degree. Deterioration of mean value of the angle of local kyphosis to 2.32˚±1.86˚was also occurred in this group.

Table 5. – Results of control study

Results	Number of cases (n = 11)
Good	8 (81.8%)
Poor	3 (18.2%)
Changes in a group of patients with good results	n = 8
By ASIA/IMSOP scale	0.21 ± 0.43
By VAS scale	0.34 ± 0.52
Changes in a group of patients with poor results	n = 3
By ASIA/IMSOP scale	0.25 ± 1.71
By VAS scale	0.43 ± 0.57
Local kyphosis angle	2.32 ± 1.84

Discussion. Spinal canal echinococcosis is rare localization of echinococcosis. It should be noted that about 50% of bone echinococcosis damages vertebral column and spreads extradurally and paravertebrally [1; 3; 4]. Although the spinal canal echinococcosis is rare, its differential diagnostics and surgical treatment are often the great challenge. Use of CT methods, MRI diagnostics and detailed medical history not always allow making a correct diagnosis on the spinal canal echinococcosis. Echinococcosis cysts are subject to differentiation with other pathological processes which are similar to neuroimaging manifestations. The treatment result is of great importance both for the a surgeon and for a patient. Considering the fact that the spinal canal echinococcosis is characterized by multiple cysts and their invasive growth, it is becoming apparent that a complex of measures oriented to prevention of postoperative recurrence should be taken. Thus, Turtas et al. [5] reported on 18 patients with the spine echinococcosis which underwent surgery, of which 9 (50%) had recurrence of disease. The current information indicate to prospectiveness of chemical prophylaxis of postoperative recurrence of the spine echinococcosis. In particular, use of Mebendazol for the purpose of prevention of recurrence of disease during postoperative period results in good treatment results. Based on cooperative research of 38 neurosurgery centres of Turkey and literature review within the period from 1990 till 2000 there were observed 63 and 111 cases of the spine echinococcosis, respectively. The recurrence was observed in 14.28% (at that, chemotherapy is applied in 33 neurosurgical centres) and 24.32% of patients [6]. Calculations of indicators characterizing deformation of bone structures of the spine were performed in 26 patients based on radiological researches. Mean values prior to operation were as follows: VWDF – 19.26% ± 15.34%, VCF – 24.57% ± 18.34%, the spinal canal narrowing indicator – 32.25% ± 17.33%. Mean value of local kyphosis angle amounted to 14.06 ± 13.44. Use of such indicators allowed us to objectivize the treatment results. It is found that improvement was observed in 25 (96%) patients as a result of surgical

operation. Lack of similar data in available references does not allow comparing the obtained results.

Conclusions

1. Operation by posterolateral approach with removal of echinococcus cysts of the spinal canal, resection of vertebral bodies damaged by echinococcosis with reliable internal stabilization will reduce pain syndrome as well as neurological disorders.

2. In remote control studies good treatment result was registered in 81.1% of patients with the spine echinococcosis.

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Section 6. Pedagogy

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THE PLACE AND ROLE OF THE WORLD ANTI-DOPING CODE IN TRAINING PROCESS OF THE YOUTH (ON THE MATERIALS OF THE POWERLIFTING DEPARTMENT OF THE CHILDREN'S AND YOUTH SPORT SCHOOL)

Abstract: The content of the World Anti-Doping Code is disclosed in the system of using its main articles in the formation of a healthy lifestyle at the powerlifting section of the children's and youth sport school. Taking into account the features of powerlifting, the main forms of its mastering are indicated in the context of the implementation of the European integration principles of Ukraine.

Keywords: healthy lifestyle, Olympic Charter, powerlifting, regulations, training process, Ukrainian Championship, UNESCO Convention, World Anti-Doping Code.

The history of the set of children's and youth sports schools refers to the period of scientific and methodological base creation, when a healthy lifestyle of young people was a priority for the state. As of January 1, 2017, the number of these schools in Ukraine was 1155, including Specialized Children's Sports Schools of the Olympic reserve, their number was 1293 [2]. On the basis of these schools, 5.525 branches and 493.246 pupils were formed throughout the country, developing their abilities in particular sports [3].

The central final stage in the work of any sports educational institution is the preparation for competitions of various levels, the most difficult and responsible is participation in the championships of Ukraine for a particular sport. Let us therefore turn to the rules of holding the Ukrainian Powerlifting Championship among students of universities and pupils of the children's and youth sports schools in 2017 [4].

In accordance with this regulation, the Ukrainian Powerlifting Championship among students of universities and pupils of the children's and youth sports schools was conducted with the aim:

– to introduce physical culture and sports in the daily life of youth, to improve of their health;

– to activate mass physical culture and work in all parts of the physical education system;

– to develop and popularize powerlifting among various age groups of the country's population;

– to enhance the skills of young powerlifters;

– to identify young talented powerlifters and their selection into the national teams of Ukraine for 2018.

Working in with the generally accepted system, the management of the entire organization and the conduct of the competitions was performed by the Ministry of Youth and Sports of Ukraine and the Federation of Powerlifting of our country. Responsibility for the preparation and direct conduct of the competitions was assigned to the Sports Department of Ivano-Frankivsk Region State Administration and the Judges Panel recommended by the Federation, whose membership was approved by the Ministry.

At the same time, the teams of the sports schools of 6 persons in each age group (gender characteristics don't matter) are allowed to participate in the competitions. The program of the competitions, the safety, the preparation of the competitions, the conditions of the championship and awarding winners was performed in the regulations.

Significant part in the above regulations is taken by the terms of financing and material support of participants, which in its content is associated with the terms and procedure for submitting applications for participation. The final section of the regulation contains characteristics of other conditions and anti-doping control. Considering the fact that the anti-doping control is a relatively new component of competitions of different levels, we will briefly dwell on the content of the World Anti-Doping Code [1]. Taking into account that any individual athlete could show a high result in a limited time interval, the range of requirements for the preparation of an athlete for competitions was gradually expanded. Everything that was not included in the list of officially accepted requirements, in the public consciousness, it often refers to the concepts of "dishonest, unjust" struggle.

In the XX century, when doping became effective in every kind of sport, and their hidden use became a secret of sports clubs, societies, states, a practical basis for the subsequent adoption of the World Anti-Doping Code was started to be developed. At present, this document includes four parts. Each part contains more than ten articles. Moreover, each article has a detailed textual definition of a specific part of the training process. In their totality, all the articles of each section are a system of interrelated, mutually complementary provisions, implementing which sports organizations, teams, countries, demonstrate to the sports community (European, international) that they are ready to compete under generally accepted conditions. The Anti-Doping Code absorbed what was previously defined in the framework of oral norms and traditions under the general title of "code of honor", "rules of the game", "order of determining winners."

Thus, the preparation of the team of athletes, including powerlifters, to participation in the Ukrainian Championship suggests the exclusion of doping on the prohibited list during the whole school year, while mastering the motor skills – [8].

Let us turn to the content of the "World Anti-Doping Code" [1]. In our opinion, the importance of this document for the formation of healthy lifestyle among adolescents at classes like powerlifting, as well as other sports, is explained by a number of interrelated reasons.

Firstly, the international sports community can't function in any historical epoch without elaboration and implementation of unified norms and rules. These include regulating the use of all types of synthetic and natural stimulants.

Secondly, in the conditions of rapid development of all natural sciences including physics, chemistry, medicine and pharmacology, as the empirical data accumulate, the spectrum of stimulants will expand. This implies limiting their use in those chapels (borders, doses), which will be considered acceptable for each time period.

Thirdly, for each sport and age groups of athletes, a set, of those medical and biological means that will not be unambiguously assessed (from the "impossible" position), will constantly expand in different countries, in different scientific schools in sports medicine and in every spectrum of the regulatory framework of international competitions.

Let's try to use those sections and provisions from this document [1], which, in our opinion, are more important for the training process at the children's and youth sports schoosl. This applies both to the initial period of the formation of an athlete's attitude to stimulants, and the direct preparation for the competitions.

The objectives of the World Anti-Doping Code and the World Anti-Doping Program are the following:

– to protect the fundamental right of athletes to participate in competitions free from doping, and thus to promote health, justice and equality for all athletes of the world;

– ensure the creation of agreed, coordinated and effective anti-doping programs, both internationally and nationally, in order to disclose, deter and prevent the use of doping [1].

The document is the fundamental and universal paper on which the World Anti-Doping Program in Sport is based. The key goal of the code is to improve the effectiveness of the fight against doping in the world by combining the main elements of this struggle within the international sports community. To achieve effective interaction on those issues in which unanimity is required, the code contains sufficiently specific provisions. However, it is quite universal in those provisions where a flexible approach to the application of its principles in practice is required.

The Code is designed taking into account the principles of proportionality and human rights. In particular, it relies on the Olympic Charter and the International Convention on Doping in Sport, adopted in Paris on October 19, 2005 (UNESCO Convention). These documents recognize the prevention of doping and the fight against doping in sport as an essential component in the work of the International Olympic Committee (IOC) and UNESCO, as well as the fundamental role of the Code.

Implementation of the course of Ukraine for European integration includes the study and fulfillment by our country the requirements of the World Anti-Doping Code. Therefore, let us dwell on the part of this document, without which, in our opinion, any interpretation of the data obtained will not be complete enough.

A separate section of the Code is devoted to a fundamental grounding for of this document necessity. Antidoping programs are designed to preserve what is really important and valuable for sports and is often called the «spirit of sport». The essence of the Olympic movement is the desire to improve the natural talents of each person. The spirit of sport is the triumph of the human spirit, body and mind. It is displayed in the values of sports and it is:

– ethics, justice and honesty;

– health;

– high level of performance;

– character and education.

At the same time sports events must bring to the athlete:

– pleasure and joy;

– a sense of collectivism (team);

– devotion and loyalty to obligations;

– respect for rules and laws.

Needless to say, the athlete from adolescence consistently forms in himself:

– respect for all participants of the competition;

– courage and tolerance;

– community and solidarity, empathy for the interests of the country.

Any doping in any form is fundamentally contrary to the spirit of the sport. The Code requires every sports organization, including the Ukrainian Powerlifting Federation, to develop and implement educational and preventive programs for athletes, including juniors, and personnel of athletes (doctors, rehabilitologists, consultants, etc.) [1].

Our appeal to the fundamental international documents [1; 5; 8] and the fundamental works of leading scientists [6; 7] gives grounds to make the following author's conclusions, in order to improve the training process today (2017–2020), one should use the entire historical experience of participation in international competitions. The sports competition in lifting heavy weights by specially gifted people (strong men) in the times of Ancient Greece fulfilled a three-pronged task:

1. Identification of the most gifted and trained individuals, as in the process of permanent military-defensive battles, it had decisive practical importance for protecting the walls of cities, forts, bridges and crossings.

2. The cult of physical strength was assessed both in the context of hunting for strong and dangerous animals, and as a part of entertainment programs for the citizens in commemoration of traditional festivities and military victories. Sports competitions performed the tasks of "social glue" in all historical epochs.

3. Selection of beginners for purposeful training at all times was not possible without the development, adoption of any quantitative standards, without which the professional growth of adolescents would not be possible, as the soldiers and defenders of their people.

Based on personal experience, the coach, using the materials of the best athletes of his group, shows the possibilities of improving results without using doping substances and methods.

Students of the Children's and Youth Sport School No. 9 have always shown real interest in getting the information from the coach, which shows the gap between the results with doping based on facts documented at

specific competitions. Considering that in the rating of any sports international competitions the position of each individual country with the detection of doping changes significantly. Consider the relationship of the Anti-Doping Code with the rating.

The rating itself, as a term used, not only in the field of international sports competitions, but also in various spheres of social and economic life, we will briefly examine the essential significance of this process. In its totality, all the above-mentioned issues now allow us to conclude that:

– firstly, in each case, the country's position changes in international rankings, this shouldn't be viewed as an isolated, self-sufficient indicator, but only in close connection with a whole group of quantitative indicators that are prepared by state statistical agencies in Ukraine and other countries;

– secondly, the subjectivity of the rating formation in each international rating agency is always closed, not covered in the documents of the agency itself, which implies an understanding of the underlying cause-effect relationship between the ratings of different agencies, different countries and at different times;

– thirdly, the change of a particular country's position (in this study of Ukraine) makes it possible quickly to assess the situation in a particular issue that is being investigated in a narrow sector of cause-effect relations and can't claim the universal nature of a scientifically valid assessment suitable for the development of a long-term strategy of the industry and the country's economy as a whole.

Without taking into account the above-mentioned author's views on the peculiarities of using international rating agencies, in our opinion, methodologically incorrect initial assumptions can be made in the process of drawing conclusions deriving only from these ratings without using them simultaneously with quantitative indicators over several years (3–5 years).

Taking into account the adopted original conceptual apparatus and research methodology, let us present the author's understanding of the completed research in pedagogical science in general and in the context of a civil society of the European type formation. Thus, having studied the works of the leading Ukrainian and foreign scientists on the a healthy lifestyle formation, in which the training process at children's and youth sports schools performs the main load, the training forms the motor skills of the teenager at the powerlifting department, we can draw the following conclusions.

Firstly, the development and adoption of the World Anti-Doping Code created for all countries a single source of the methodological base in one of the most difficult to prove areas of sports competitions.

Secondly, powerlifting as a new kind of sport, at all stages of the training process bases on the World Anti-Doping Code and it should ensure the formation of appropriate believes and attitudes of the adolescent. In the course of revealing the consequences of using prohibited substances, with serious consequences, only the cancellation of any results, including medals of all levels, can make possible the necessary result.

Thirdly, bringing to the mass consciousness of adolescents, who study at children's and youth sports school, will require from coaches to create at all stages of the preparation an entire information network explaining the content of the World Anti-Doping Code. The sports community should give a special place to the formation of the awareness about the inevitability of the cancellation of any results in case of the detection of the use of prohibited methods and substances.

Beyond such a consistent, purposeful, profound and thoughtful work, taking into account the awareness of adolescents of all age groups, the adopted code alone can't contribute to the formation of a healthy lifestyle on valeological principles.

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CRITERION APPROACH TO THE PRACTICE ORIENTATION OF A HOLISTIC SYNERGETIC MODEL OF PSYCHOLOGICAL AND PEDAGOGICAL TRAINING OF PROFESSIONAL JUDGES IN THE SYSTEM OF JUDICIAL EDUCATION OF UKRAINE

Abstract: The article reveals the importance of the criterial approach to the practical orientation of a holistic synergistic model of psychological and pedagogical training of professional judges in the system of judicial education of Ukraine. In the equality of the rights of all participants in the trial, the judge has a leader role, since he is primarily responsible for the preparation, organization, trial, and also only the unique feature of the profession of judge assigned to him – this is the right to make a decision and the responsibility for its validity, legality and justice. The judge is endowed with powers, he exercises power on behalf of Ukraine, which requires the development of a professional sense of increased responsibility for the consequences of his actions. Judicial activity is clearly regulated by law and is carried out on the basis of high moral qualities and legal awareness, as a result of the constant appreciation of the judge of the importance of his activities to society. All actions of the judge are clearly regulated by the Constitution of Ukraine and the Laws, while judges must be independent of all extraneous influences, since only such independence from various external and internal factors (political, material and economic, personal) can ensure the objectivity and fairness of decisions taken a judge or a judicial panel during the trial of a case. The article reveals the mechanisms of formation of the responsibility and leadership of the judge, as well as the formation of candidates for the position of judges and active judges during the training in the National School of Judges of Ukraine of practical orientation of a holistic synergetic model of psychological and pedagogical training in the system of judicial education of Ukraine.

Keywords: judge education, synergetic model, self-regulation, leadership, pedagogical mastery, psychological and pedagogical techniques, reflection, professional judge, interactive training, training, distance learning.

A judge is empowered to act as a State representative, that is why it is a judge, who is conferred with high powers, what increases professional sense of enhanced responsibility for consequences from own actions, judge's activity is clearly regulated with Law. His/her activities are realized on the basis of high moral qualities, legal awareness, as a result of judge's understanding how important is his/her activities for society. Independence from different internal and external factors (political, material & economic and personal) may ensure objectivity and fairness of the decisions made by a judge or judicial board in course of court hearing of the case. In the equality of the rights of all participants in the trial, the judge has a leader role, since he/she is primarily responsible

for the preparation, organization and trial of criminal, civil and administrative cases as well as the responsibility for its validity, legality of judgment [1].

Modern science interprets "leadership" as the process of social impact due to what a leader gets support from other members of community to reach the goal. As it is known, phenomenon of a leadership is described by number of theories: situational, functional, behavioral and others as well as integral theory of leadership. During the centuries people are seeking the qualities peculiar to the leaders. Platon and Plutarch [2] were interested in questions, what quality distinguishes leaders from ordinary people, therefore declaring that source of leadership is in individual features of a person.

As it is known, numerous authors of XIX century studied phenomenon of leadership. They compared a leader of crown with the slaves and tried finding explanation. One of the most fantastic theories was represented by Francis Galton [3], who considered that leadership is demonstration of natural, inherited gift. Cecil Rhodes [4], for his part, convinced that corresponding training can learn a gifted person how to be a leader. In order to provide practical support for his theory, in 1902 C. Rhodes constituted the grant for study on Oxford University for the students with leader qualities.

Note the fact that in the 1920's, when interest to management as to the science occurred at first, theory of leadership began to develop. The first feature noticed by the researchers is a possible availability of common personal traits of the well-known leaders. That is how "Traits theory" or "Great people theory" emerged. But, it turned out that it is really difficult to specify general traits. Of course, there were a lot of common qualities. For example, such traits as: high level of intellect, wide knowledge, conspicuous appearance, self-confidence, etc. But the researchers failed to create a general portrait of a leader. The people, who did not have the above mentioned traits were outstanding leaders too [5].

In 1940s –1950s, numerous evaluations of previously proposed theories [6] proved the need to create new approach to the problem of leadership. First of all, as the psychologists noted, that they had not confirmed the fact that the mentioned traits turned people to leaders under some conditions, but under other conditions such traits were not required for leadership. As a result, new theories shifted to conduct theory, which tended to take a leading position. This approach was dominant in psychology of leadership during several decades.

We should notify that development of situational theory of leadership was the next step. According to this theory, a leader appears under certain circumstances. Depending on the task, a leader may change [5].

A corporate leader, who wants to continue being effective, shall be able to adapt varying circumstances quickly and flexibly change his/her behavior. Thus, essence of leadership lies in the fact that the followers recognize a leader only in the case, when he/she proved his/her competence and value for them [7; 8].

In view of the aforesaid, let us emphasize some aspects of practical implementation of psychology and pedagogical support of personal and professional self-improvement of a judge as support of a capable leader of the XXI century on the basis of synergic approach.

Thus, our practical course "Psychological support for personal and professional self-improvement of a judge" provides: unassisted completion of tests and practical tasks intended to diagnostic assessment and personal and professional self-improvement; application of previously obtained knowledge and skills during multichannel interaction in course of group trainings. Psychological and pedagogical techniques of group studies in the frame of practical courses include activities in small groups (providing synergetic effect), when each group performs some specific type of practical work (differential training). The instructions, which regulate and determine activities of the participants is a way to control training activities during group practical courses. In the same time, practical works have research and reflexive nature.

The developed practical course is also intended to learn new examples of self-regulation of conduct, attitude of mind, positive emotional reactions in response to external irritants, improvement of stress resistance in response to effective changes of internal dialogue, attitude of the leaders to themselves and to the others, to their values, professional motivation, self-development and self-improvement, awareness of positive image creation for judge-leader. The play-type techniques of the practical courses are based on real-life situations of the participants, with due regard to possible moral and ethical restrictions. Moreover, psycho-diagnostics is carried out by the listeners themselves and individual interpretation of its results become known only to a respondent.

Using this method the participants strengthen their knowledge about typology of behavior reactions of human, strategy of response to behavioral reactions of other people, means and methods of resistance to manipulative influence, styles of effective communication (verbal and non-verbal), peculiar features of different models of communication, peculiar features of impact of information received through different perception channels (colour/sound/light/odour, etc.) on psychoemotional condition of a human, peculiar features of formation and change of personal value and behavioral paradigms, social and psychological resources of judges, their psychophysiological, social and cultural and economic potential, peculiar features of business etiquette, business image (role of compliments, status markers and differences, etc.).

Self-reflection of the obtained professional experience shows that as a result of adoption of informative modules of the practical course "Psychological support for personal and professional self-improvement of a judge" the participants learn how to interpret and predict behavior of a companion by non-verbal signs, determine dominant needs of people using methods of indirect management and seek effective alternative solutions, determine and apply the most productive techniques and methods of verbal and non-verbal infusion and self-hypnosis, overcome psychological barriers in communication with the representatives of different social and age categories – understand true meaning of a talker's message using psychological methods of perception (understanding) of a partner and discovery of the hidden partner's reactions, realize own subconscious motivational and logical paradigms and, if required, paraphrase them into more effective ones, efficiently use relax techniques and self-recovery of psychic forces under conditions of stress and limited time, perform self-diagnostics of efficiency of dynamics of subconscious psychical processes, change own subconscious dominating stereotyped behavioral models to more comfort and productive ones, create own reliable and positive image in accordance with desired goals during communication with a partner (work, family, leisure, etc.): common facial expression, visual and motor reactions, gestures, peculiar features of voice, manner of dialoging, belonging to the specific group, casual/business/special clothing.

Moreover, during of these training courses the judges learn how to prevent professional psychosomatic disease (sleep disorder, epigastric burning, high/low level of blood sugar, etc.), using methods of improvement of perception, attention, memory, thinking, development of positive thinking, "smart" relation to feelings and emotions, development of intellectual abilities, harmonization of self-improvement program from "I am real" in accordance with vision "I am ideal" passing the main blocks: I am a concept, sphere of motivation, way of thinking, style of making decisions, style of interindividual relations, resistance to stress, they use special methods and techniques to resolve such problems as: absence of structuredness of life program, nervousness, warm temper, aggression, some speech disturbances (hesitation in speech, stutter) in case of acute situations, group methods and work techniques are applied, correct methods to offset criticism, methods to train attention and active listening, practical use of orator skills, define own targets by constructing imaginative visions and imaginary reactions, increase skills of cognitive self-programming for creation and implementation of promising opportunities for self-improvement in the professional sphere and private life [9].

Individual components of this practical course are united in the integral whole based on united synergetic emotional and regulatory model. Due to this model, the participants can practice simultaneously as in plane of constant emotional and positive professional behavior, practical activities, and in cognitive plain of increase of steady motivation to self-improvement. Super task of a practical course is assistance intended for the participants to understand their role, mission and sense of life in the present day stage of development of Ukraine.

As it is known, novelty of philosophy of open dynamic system management lays in the requirements to up-to-date understanding of fundamentally new needs of educational and social space, selection of priorities for development, search of new methods to resolve problems, use of efficient managerial procedures. The scientists and particularly A. V. Semenova, declare that such kind of management consider update of regulatory and legal framework, social-and-cultural, organizational-and-functional, information-and-technological subsystems, training and advanced professional training of the supervisors and teachers of educational institutions. Nowadays, actual educational systems for management are

forecast and operational efficiency, goal-setting, choice of priorities, innovativeness, attraction and involvement of teachers and parents, change of stimulation and information systems, development and implementation of projects, development programs. In our modern and dynamic world, one of methods of educational system "survival" is innovative activities of educational institutions, which lead to satisfaction of new needs of social society. Moreover, as the scientists declare, innovations are inextricably connected with experimental and research work, as target of each experiment is creation of something new on the basis of modification, designing, implementation of novel approaches, etc. [10].

Introduction of holistic synergetic model of psychological and pedagogical training of professional judges in the system of judicial education of Ukraine was performed in trial regime by systematic implementation of training technologies and interactive forms of learning and cognitive activities of the specialists. Thus, in the framework of our experimental strategy we tell about "Psychological and pedagogical methods of self-regulation skills improvement and prevention of emotional burnout in professional activities of judges" and teach the training course "Basic principles of pedagogical excellence of judges". In terms of originality of teaching methods applied for the last mentioned training course, these methods included interactive lectures and seminar classes (based on interactive trainings), by resolving simulated tasks, business games, etc.) And independent (by repeating previously learned material, etc.) classes.

Awareness of practical orientation of holistic synergetic model of psychological and pedagogic training of professional judges by the judges themselves within judicial educational system, when the judges demonstrated significant pedagogical potential in terms of increase of psychological and pedagogical training level, because the personality of a judge and judge's inner world is the object of cognition and means of learning. Shift fro theoretical knowledge to practice was not direct and immediate, it consisted from the range of the offset links. This knowledge is the result of solving the problems, which have personal nature. The judge, who does not know practical techniques of self-regulation and preventive measures against emotional burnout during professional activities, faces at once complexity of the specific professional (emotional and problem) situations.

Training play-type situations are valuable because, while they are solved, attention of judges is focused on previously selected and restricted situations, what facilitates forecasting. Training play-type situations are being solved under direct participation of a teacher, who makes immediate correction and assessment of the decisions, helps to express the thoughts clearly and reflect emotions, forecast consequences. Application of training play-type situations significantly impacts motivational and emotional spheres of a judge. It can be explained by the fact that change of the form of training material presentation results definite reorganization of motivational and cognitive activities [11]. We should notify that actually, some specific training play-type situation is a problem, which can be faced by a judge during his/her activities and which will require for a judge to make analysis, specific decisions, specific activities. In this context, we were supported with a creative work of the researchers [12].

The development and analysis of the types of situations depending on the social context, in the ratio of personal needs to the profession of a judge, enabled us to diagnose the following groups of professional values: 1) values associated with public beliefs (the importance of work, prestige), 2) satisfaction of the need for communication (interesting people, etc.) The development and analysis of the types of situations depending on the social context, in the ratio of personal needs to the profession of the judge, enabled us to diagnose the following groups of professional values: 1) values associated with public beliefs (the importance of work, prestige), 2) satisfaction of the need for communication (interesting people, etc.) 3) values related to self-improvement (development of intellectual abilities, etc.) 4) values associated with self-realization (the nature of labor, etc.) 5) values related with to pragmatic needs (self-affirmation, professional growth, and etc.), 6) the value of the tool type (public recognition of the results of judge's labor, getting know the theory and techniques, etc.). Self-control situations were used to increase judges' interest in constant self-improvement, development of self-regulation skills and prevention of emotional burnout during professional activities, self-education. Usually while performing written tasks for situations of self-control, the exchange of work between judges was typical.

Thus, during the pilot study, we continued developing evaluation procedures. In particular, there was a

need to develop author's questionnaires "Scale of self-assessment of the emotional state of a judge", "Assessment of motivation for attitudes toward the professional activities of a judge", "Assessment of the motivation for reaching the need for achievement in accordance with a modified scale of assessment." We conducted a survey and developed basic questions of issue-related problematic discussions with the judges. We developed a draft of the strategy plan for individual self-improvement of a judge, which contains the following sections: annotation, sections devoted to the current state (the results of the previous self-diagnosis), development of a comprehensive strategy of self-development, and, finally, self-control.

Therefore, this approach allowed systematizing the actual data of individual process of self-improvement of judges in conformity with certain aspects of self-assessment of personal and professional qualities. In particular, those quality, which to be improved; actions to be applied to improve the results; type of training, which could help to achieve the goal; process of self-control performance.

In addition, another method intended to eliminate psychological stereotypes was proposed and used: ability to modify effectually the conditions of a task. As R. Granovskaya fairly emphasizes, transfer of the solution to another space is efficient [13], that is why it became possible to use for the lessons different ways for seeking solution (verbal, non-verbal, graphical, dimensional, etc.). Psychological barriers were being overcome gradually, while nature of knowledge acquisition was studied as well as reflection of the participants: soon, when an idea was introduced and defined after the training materials had been traditionally consolidated, in particular, using the method of activity analysis from perspective of novelty (according to M. Gafitulin [14]).

We consider that character of multichannel interaction of subjects in educational judges' environment in course of solving professional and psychological situations is the main means, which allow monitoring positive dynamics of the process, because efficiency of a training play-type situations during professional training of judges depends on numerous elements and especially from emotional and positive educational judges environment including active interaction of all its subjects. Previously mentioned elements were defined and taken into account with the help of the corresponding procedures of diagnostics.

Understanding of own feelings and emotions related to the profession of a judge was achieved with the help of interactive plays "Ideal judge", "Unwanted" and etc. Types of qualities, which characterize professional image, were assessed using the scale applied to study self-assessment. Based on the researches performed in the frame of this aspect, maturity of the professional image "I am judge!" was recognized as an important indicator of the need in self-improvement, self-actualization as a professional. In accordance with the parameter "Profession oriented reflection»: 1) understanding of own feelings and emotions – non-understanding of own feelings and emotions; 2) need in self-control – lack of need in self-control; 3) trust in people around – mistrust in people around, etc. Founded abstractness allowed for the persons subjected to testing to define effectively the individual meanings included to interpretation of the parameters.

Moreover, it was very important for judges to become open to criticism of the colleagues, to get abilities of a team-player due to training exercise "Lego", because, as it is known, specific feature of judge's work expects that a judge is a procession and independent person, besides the fact that all these persons are the members of a staff teams consisting of 20 to 200 persons and shall be capable to work as the team players. What is the most important, upon the results of this training, the judges understood, if they are happy and what they have to do to become happy.

Thus, the implementation of the proposed experimental practical orientation of the holistic synergetic model of the psychological and pedagogical training of the professional judges in the framework of the system of judges' education demonstrated high efficiency and allowed significantly optimizing the research process, will certainly result formation of highly qualified judicial staff, which will be able to respond to belief in judicial power and meet public expectations – expectations of the participants of court proceedings in relation to efficiency of the court procedures and possibility to defend violated rights, freedoms and interests of individual persons and legal entities in the court, which is the main task of the court.

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PULSOMETRIC PECULIARITIES OF SPORTSMEN IN DYNAMICS OF THEIR ADAPTATION TO CONDITIONS OF INCREASING MOUNTAINOUS HYPOXIA

Abstract: Pulsometric peculiarities of sportsmen in dynamics of their adaptation to conditions of increasing mountainous hypoxia. Some information about increasing the pulse rate (pulsometry) of sportsmen in the process of adaptation in the conditions of hypoxia on the height of 2100–2400 m over sea level is given in this article. The increasing of pulse rate from the 1st day till 7th day on the height of 2100 m and the remaining on the high level if control indicators on the 15th day of experiment after physical load on the height of 2400 m showed that it great differs from the quiet position on the height of 2100 m and let us speak about inadequate compensator of heart

Keywords: pulse rate, hypoxia, adaptation, sea level, physical load, heart beat.

The essence of problem to adaptation in psychology of sport is defined, first of all, the organism of sportsman has to adapt to physical load in short time. Precisely, the speed of adaptation and its duration are defined the health and state of training of sportsman. That's why the special scientific interest for practice of sport presents the development of systematic foundation of adaptation of sportsman's organism in the process of achieving the highest sport mastery [1–4]. It is known that morpho-functional peculiarities of person's organism formed in the process of long evolutional period, can't be changed so fast as structure, function and character of training-competition loads in sport. Contradiction of time between these processes can lead to functional decay, which can be displayed as different pathologies [4–6].

It is proved that the condition of experience has a great essence in assessment of pulse change [5–10]. The assessment of changing the heartbeat rate of persons in a short period in mountainous depends on: a) height of place; b) climate-geographical position of mountainous region and c) degrees of adaptation of organism to different heights. In this case, analyzing the contradicting literary information on studied issue, it can be defined the lack of information about reaction of cardio respirator systems in the process of person residing in various mountainous areas.

Methods of researches

Reaction of pulse on proportional physical load is considered as the main aerobe indicator, which characterize the productivity of cardiovascular system. That's why in functional diagnostics of sportsmen the Index of Howard step-test (IHST) is often applied, which is used to define the reactions of cardiovascular system to hard physical load. In testing monitor for defining pulse of the term "Sein" (Southern Korea), regulated by step-ergo meter mechanic metronome and stopwatch are used in testing. The height of step and time of climbing are chosen in according to the sex and age of examined people. Rate of climbing is equal to 30 cycles per minute. Each cycle includes 4 steps. Rate is defined by metronome,

which is fixed in every 120 beats per minute. After finishing the test, examined person sits on the chair and during first 30 seconds with 2-,3-and 3th minutes of rehabilitation, the numbers of pulse beats are counted three times. If examined person due to his exhaustion, can't reach the necessary rate in 15–20 seconds. Test also can be finished in external features of excessive fatigue: paleness of face, stumbling and etc.

IHST – is calculated as the following formula:

$IHST = t$

$$IHST = \frac{t \cdot 100}{(F2 + f3 + f4) \cdot 2}$$

(c) time of climbing, f_1, f_2, f_3, f_4 – the amount of pulse beats during the first 30 seconds in 2-,3-and 4-minutes of rehabilitation. For saving time, the contracted formula can be used in large researches which allow for one calculation of pulse beats in first 30 seconds the second minute of rehabilitation.

Then Physical training is assessed according to given index. On IHST below 55 is considered as weak, 55–64 is considered as less medium and 65–79 as weak, 80–89 as good and more than 80 as excellent. Statistic calculation of given material is made according to criteria Student-Fisher, where is $X \pm S_x$. Results of investigations. Given results proved that in the process of adaptation of sportsmen-trackmen in the height over 2 km over sea level (after prediction of their adaptation to the height of 1800 m) concise tendency of increasing rate of heartbeat is pointed out. Analysis of percent attitude to pulse rate of participants' group of experiment showed that if the 1st day of adaptation the quantity is equal to 127 ± 6.5%, next days in the height of 2100 m is equal to 149.7 ± 5.7 (third day), 148.3 ± 4.6 (seventh day),142.9 ± 3.8 (15th day). The first day of adaptation on the height of 2100 m over sea level the pulse rate is equal to 77.8 ± 3.1, when the next days 84.2 ± 3.8 (3rd day), 82.4 + 3.6 (7th day) and 80.8 ± 3.9 (15th day).

In these series of experiments are clear that the first days sportsmen on the height of 2100 m over sea level felt the decreasing of aerobic opportunities, worsening of functional state of organism and insomnia. After 3–5 days they began to adaptation, it is characterized that sportsmen in retrained muscle activity feel themselves well, but hard physical load, when oxygen decreases in blood (hypoxia) encumbered.

Special attention was paid to pulse rate of sportsmen and rate of their normalization after proportioned physical load. So, the rate of pulse normalization on the 4th minute physical load after 2100 m is higher than background is fixed up. Given results on dynamics of pulse rate on given height after physical load showed palpitation, which is connected with hemodynamic and cardio respirator indicators in the conditions of mountainous hypoxia (Table 1).

Table 1. – Character and rate of normalization of pulse after proportioned load on the height of 2100 m over sea level

Indicator	The 1st day		The 3rd day		The 7th day		The 15th day	
	n = 7		n = 7		n = 7		n = 7	
	background	experience	background	experience	background	experience	background	experience
Repose	72.2 ± 2.2	74.6 ± 2.6	72.4 ± 2.2	70.6 ± 2.4	60.6 ± 1.8	65.9 ± 1.3	72.6 ± 2.2	70.8 ± 2.2
In 4 minutes after load	75.4 ± 2.6	78.6 ± 1.3	79.4 ± 3.1	72.4 ± 2.2	75.5 ± 2.6	76.4 ± 2.8	75.9 ± 2.6	72.8 ± 2.2
Percent to repose	1210. ± 7.4	105.4 ± 4.6	127.4 ± 8.1	102.9 ± 4.1	125.0 ± 7.6	101.5 ± 4.1	121.0 ± 7.4	102.9 ± 4.1

It is defined that increasing of pulse rate after physical load on the height of 2100 over sea level was less than background, though in absolute quantity it is comparable. If we consider that beat amount doesn't change, we can speak about maladaptive reaction of heart activity on physical load on attitude to repose. So the 1st day of adaptation on the height of 2100 m over sea level the rate of increasing pulse in percent attitude was equal to 121.0±7.4% on attitude to repose. This tendency lasts during all periods of observations and on the 15th day this amount is equal to 102.9 ± 4.1%.

So in our opinion, increasing, then decreasing the pulse rate is the first, easily defined circular effect of hypoxia. But hypoxic state which leads to changing the

activity of central nerve system accompanies with decreasing the rate of heart beating, it may depends on increasing tone of pneumogastric nerve.

More important variation of rate is observed after climbing of participants of experiment to the height of 2400 m over sea level as it is shown in 2-Table background indicators of pulse rate are equal to 69–72 beats/min, after climbing to the height of 2400 m these indicators rose in following order: 94.2 ± 7.1 (the 1st day), 87.7 ± 6.8 (the 3rd day), 86.6 ± 6.7 (the 5th day), 85.5 ± 6.1 (the 7th day), 76.8 ± 4.9 (the 10th day) and 85.4 ± 6.1 (the 15th day). If on the first day of adaptation was observed the highest rate of pulse (94.21 ± 4.9 beats/min), on the 10th day of mountainous adaptation it was the lowest (76.8 ± 4.9 beats/min). But all these indicators were higher in comparison with background amount.

Table 2. – Character of changes of background amount of pulse in quiet position on the height of 2400 m over sea level

Indicator	Days					
	The 1st	The 3rd	The 5th	The 7th	The 10th	The 15th
Number of participants	n = 14	n = 14	n = 14	n = 14	n = 14	n = 14
Background, beats/min	69.4 + 3.4	69.413.4	72.6 + 4.3	69.8 + 3.4	69.6 + 3.4	69.5 + 3.4
Height 2400 m, beats/min	04.2 + 7.1	87.7 + 6.8	86.6 + 6.7	85.5161	76.8 + 4.9	85.4 + 6.1
Percent to background	157.7110.2	145.518.9	138.716.9	134.917.3	126.7 + 6.8	141.7 + 8.1

As it is clear from (Table 2), dynamics and character of pulse change in different periods of observations of sportsmen on the height of 2400 m over sea level are simple enough, though on the 10th day of adaptation in a quiet position is pointed out the tendency of decreasing the pulse rate, then its increasing is observed.

As it is fixed (3-Table), reaction of pulse rate on proportioned physical load of permanent and temporary dwellers-participants of experiment is diametrically opposed. So, if percent of declination of permanent dwellers of mountains on the 7th day to the attitude of background is equal to 15.1 ± 1.2, on the 10th and 15th days is 35.3 ± 2.6 and 16.1 ± 1.2%. Temporary dwellers' declination is 50.3 ± 3.8 (on the 7th day), 60.6 ± 6.2 (the 10th day) and 75.2 ± 5.6% (the 15th day).

Table 3. – Changing the pulse rate proportioned physical load (in percent in aq quiet position) of permanent and temporary participants of the experiment on the 7th–15th days of adaptation on the height of 2400 m over sea level

Indicator, background%	The 7th day		The 10th day		The 15th day	
	Percent to repose	Declination from background	Percent to repose	Declination from background	Percent to repose	Declination from background
Permanent dwellers	121.5 ± 4.4	–15.1 ± 1.2	171.6 + 6.8	+ 35.3 ± 2.6	152.8 ± 9.4	+ 161 ± 12
Temporary dwellers	150.4 ± 6.8	–50.3 + 3.S	140.6 + 5.9	– 60.6 ± 6.2	1255 + 4.5	– 75.2 ± 56

So, on the height of 2400 m over sea level the pulse rate of permanent and temporary dwellers (sportsmen) after physical load considerably increased than on the height of 2100 m. The changes in pulse rate on the 15th day of adaptation are interconnected due to emotional reaction while climb-down from the height of 2400 m. As on the height of 2100 m, sportsmen's pulse rate is increased after physical load though absolute amount are high in these conditions of mountains.

The underlined position is individual also for normalization of pulse after physical load that in certain measures let us consider that the conclusions of some

researchers [8; 11] about increasing physical ability of person based on the assessment pulse rate during proportioned physical load. On the examples of reactions of cardiovascular system, it is proved that climbing of sportsmen up in different height of mountains is accompanied with particular reconstruction of functional reactions, which has the aim to compensate the lack of oxygen in the organism. As step-by-step climbing to different height showed that every step of height leads to specific reconstruction of cardiovascular system functions [9; 10]. Besides it, ultraviolet sun radiation plays a particular role on different heights which remain in the atmosphere on the highlands and has sensibility of organism to the lack of oxygen (hypoxia).

Conclusion. It is necessary to widen the devices of investigation on the direction of complex multifunctional assessment of state and reconstruction of immune competent bodies for full characteristics of dynamics of mechanisms of formation in mountainous adaptation of person in order to deepen the knowledge about qualified state characteristics in the conditions of high mountains.

So, we can conclude that.

1) The tendency of increasing pulse rate, in particular sportsmen decreasing of pulse from 1st till 15th day is observed in the dynamics of adaptation of sportsmen to increscent mountain hypoxia. Increasing of pulse rate after proportioned physical load on the height of 2100–2400 m over sea level is much more than background data and this amount can be compared in absolute significance;

2) Increasing the pulse rate in the conditions of mountain hypoxia provoked by increasing of peripheral resistance of circulatory vessels connected with deficit of oxygen and character of regional bloodstream;

3) Changing of heartbeat rate in the conditions of increasing mountain hypoxia is connected with the activity of cardio respirator mechanisms where the vegetative mechanism of regulation has leading importance. Reaction of pulse on the height can be individually fluctuated.

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FORMATION OF DATABASES ON PLANT COVER FOR MAP-MAKING OF DEGRADATION PROCESSES USING REMOTE SENSING MATERIAL PROCESSING

Abstract: This manuscript provides material on the advantages ofusing the data of remote sensing in soil degradation studies. The authors have stated that the application of space methods in soil cover mapping avoids considerable labor content of work and the subjectivity of information inherent in traditional methods of research.

Keywords: three-dimensional model of the terrain, remote sensing, land degradation, vegetation calculation index, decoding signs.

At present, soil degradation presents a serious environmental problem; it includes: erosion, salinization, dehumification, desertification, pollution, etc. For the monitoring of soil condition and creation of cartographic database of geo-information systems (GIS), the use of materials of remote sensing (MRS) of the Earth is considered to be the most economically profitable and acceptable solution.The progress of soil mapping, the process ofsoil cover studying, correction and making of soil maps cannot be imagined without the use of remote sensing materials. Remote sensing is very important and often indispensable in the Earth exploration. Modern achievements of space technology and surveying equipment made it possible to analyze, map, study and evaluate the territories of various localities. Currentstage of the development of space and ground facilities makes it possible to acquire images of a particular region several times a day, and modern computing capabilities ensure high rate of data processing. Also, the main advantage of the application of MRS in degradation study is obtaining information in any weather, at any time of the day and of a certain surface layer under investigation.But the fact should be noted that the effective use of remote sensing (RS), among other things, is possible if two basic

conditions are met: the first is an essential knowledge of the subject or objects under study and the ability to exactly set the research task. From this follows the second condition – the need to know the properties and features of RS materials, the ability to choose certain types of them for solving specific problems.

Modern state-of-the-art of problem. Remote-sensing has received its modern development thanks to the improvement of aerospace survey methods, the installation of personal stations for receiving space information, and the emergence of geographic information systems. This was preceded by a whole era of remote sensing, which deserves attention from historical and scientific point of view.

The first aerial surveys, for the purpose of soil mapping, were carried out in 1929. The result was a soil map at a scale of 1: 50000. The first aerial survey of the Earth's surface was carried out by cosmonaut G. S. Titov on 6th of August, 1961 from Vostok-2 spaceship [7]. Soyuzprogramdeveloped later, as one of the main tasks in the field of space exploration outlined a program of the principle of using manned spaceship for exploring the earth in the interests of various sectors of national economy.Visual observations, as well as photographing the Earth, various forms and types of terrain relief were continued during the joint flight of the Soyuz-4 and Soyuz-5 spaceships. Crews of manned spaceships Soyuz-6, Soyuz-7, Soyuz-8 have carried out studies on the reflectivity of forest areas and desert areas. Visual observations and aerial surveys were carried out in different areas of the spectrum. The obtained materials of space survey have found application in various branches of national economy in solution of the whole complex of problems.

The study of the materials of space surveyand their application in thematic mapping was carried out by V. L. Andronnikov [1; 3], A. M. Berlyant [4; 5], E. V. Volkova [6], E. N. Molchanov [10], E. A. Pankova [11], D. I. Rukhovich [12], U. T. Tadjiev [15; 16], I.Yu. Savin [13], G. T. Jalilova [7; 8] and others. In these studies the fundamentals of remote sensing are discussed in detail, technical parameters and classification of surveying cameras are given according to their purpose. Varioustypes of space surveyhave been comprehensively analyzed, characteristics of space survey images are given as well as the assessment of their informative properties.

According to V. L. Andronnikov [1; 2], the term "remote sensing" was introduced in 1960 by geographer E. SelinPrunt (USA) and is now used in all countries of the world. M. S. Simakova [14] mentioned in her publications that topography and remote sensing materials are of particular importance in mapping soil cover. They give information on the various forms, the dimensions of terrain relief, allow researchers to mark out certain natural boundaries. Types, sizes, forms of relief are usually associated with geological structure of the terrain, the granulometric composition and the type of soil-forming rocks.The topographic map also contains a characteristic of vegetation in a generalized form, and remote sensing materials contain complex information on the relief, vegetation, and soils. According to E. K. Kurbanbekov and G. T. Sidorenko [9], when mapping soil cover, the advantages inherent in space images determined: the efficiency of information obtaining; high accuracy of contouring of soil differences; the possibility of mapping the components of natural environment, which conditions the scientific effectiveness of space methods of soil research. U. Tadjiev in [15; 16], reveals the advantages of space methods for studying natural environment, including soil cover, in terms of the globality, regularity, periodicity and complexity of observations. He notes that an important feature of space image is its efficiency, which makes it possible to obtain data on the state of vegetation, the top-soil, the development of erosion processes, the saline areas and the state of agricultural crops at the moment. In addition, the application of space methods in top-soil mapping allows to avoid considerable labor content and subjectivity inherent in traditional methods of research [7; 8].

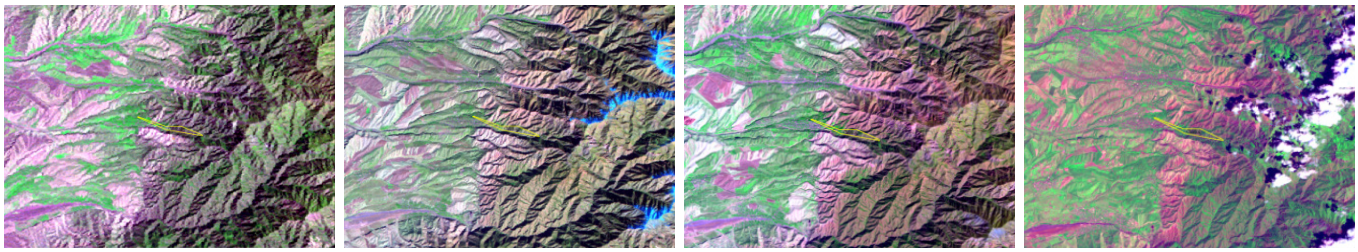
Objects and methods of research. A san object of research, there is an image of the top-soil of vertical zonation: dark sierozem soils, mountain brown carbonate, mountain brown typical and mountain brown leached soils located in the western branches of the Chatkal ridge, and also an image of the top-soil of horizontal zonation: irrigated sierozem-meadow, irrigated light sierozem, irrigated marsh-meadow, irrigated meadow, irrigated meadow-sierozem soils, and also typical virgin sierozem, sierozem-meadow, mead ow soils and mead ow solonchaks (saline lands) prevalent in the territory of the Jizzakh steppe.

Studies on selection of remote sensing materials was carried out according to the generally accepted

methodology of aerospace-geological research "Methodological recommendations for the conduct of space-geological research in Uzbekistan" (1982), Direction on the organization of aerospace-geological research (AKGI) of the Republic of Uzbekistan (2002). Theprocessing of remote sensing images was carried out by software and hardware: Global mapper 17, ENVI, ERDAS, ArcGis10 and others.

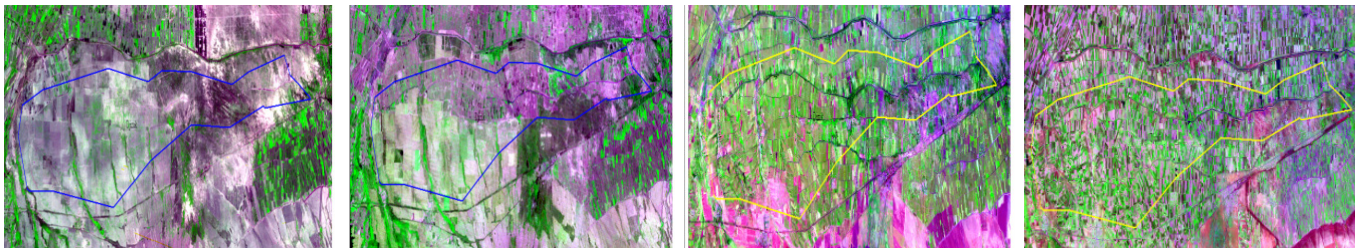
Research results. To perform this project, it was necessary to select the space images of various types and modesof the territories under investigation. The images of remote sensing from the Earth satellite systems Landsat 7 TM, Terra (Aster), SRTM, SPOT-4 and QUICKBIRD (GOOGLE MAPS) were selected. Each space image of Landsat (Fig. 1. 2), Aster (Fig. 3) and QUICKBIRD (Fig. 4) types is a specific set of archive files provided to the user for further processing. The number of provided files depends on the type of sensor and may reach 17 elements. For example, for Aster –it is14 archived channel images plus a graphic image of survey subject in the form of a graphic file, a metadata file and a snapshot caption file for automated processing. For Landsat 7 ETM + it consists of 12 files.

The Landsat program is the most long-term project for obtaining satellite images ofthe Earth. The first of the satellites under the program was launched in 1972, the last one, to date, Landsat 8 – on 11th of February, 2013. The equipment installed on the Landsat satellites has made billions of images. Pictures taken in the United States and in satellite receiving stations around the world are a unique resource for carrying out a wmultitude of scientific research in the field of agriculture, cartography, soil science, geology, forestry, etc. As mentioned above, Landsat 7 takes images in 8 spectral bands with a spatial resolution from 15 to 60 meters per pixel. The frequency of data collection for the entire planet was originally 16–18 days.



Landsat 4 (4 channel-57 meters per pixel) – 1977 y. | Landsat 7 (7channel-28 meters per pixel) – 1989y. | Landsat 7 (7channel-28 meters per pixel) – 2002y. | Landsat 8 (11channel-28 meters per pixel) – 2013y.

Figure 1. Space image of LANDSAT of the western branches of the Chatkal ridge

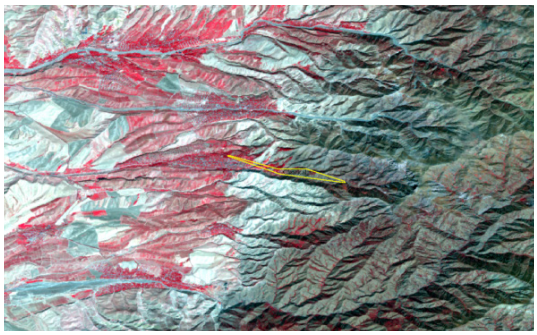


Landsat 4 (4 channel-57 meters per pixel) – 1977 y. | Landsat 4 (4 channel-57 meters per pixel) – 1980y. | Landsat7 (7channel-28 meters per pixel) – 1989y. | Landsat8 (11channel-28 meters per pixel) – 2013y.

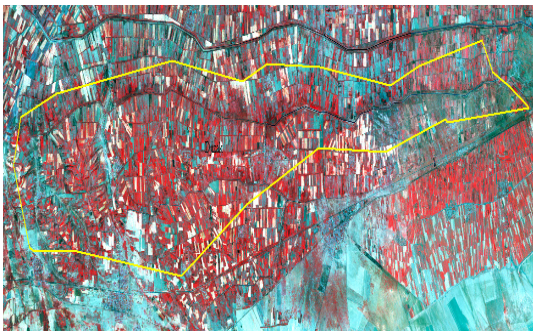
Figure 2. Space image of LANDSAT of the Djizzak steppe

Terra (Aster) program – satellite system Terra with optical-electronic sensor ASTER -was launched on December 18, 1999. Data obtained with ASTER sensor are used for a wide range of applied and research tasks due to the unique characteristics of this device: it allows one to obtain images of earth's surface with a resolution from 15 meters in 14 different spectral channels.The possibility of these images in the infrared (thermal) range makes it possible to analyze the Earth's surface at any time of the day; they are used for geological and topographic

mapping, creating three-dimensional terrain models, studying global changes, analyzing elements of earth's surface, for hydrological, climatological and soil studies.



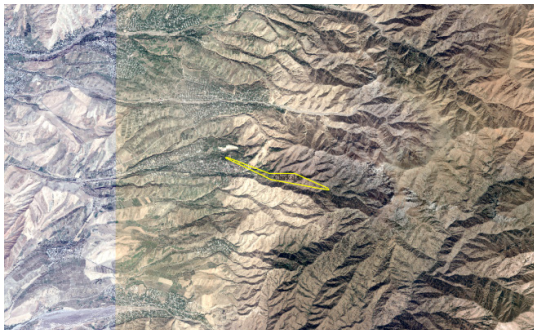
Aster (14 channel – 15 meters per pixel) – 2005y. Chatkal ridge



Aster (14 channel – 15 meters per pixel) – 2005y. Djizzak steppe

Figure 3.Space image of TERRA satellite system

Space images QUICKBIRD have the best resolution of all satellites, presented in remote sensing market. Images are transmitted as panchromatic (0.61m per pixel) and multispectral (2.4m per pixel) ones, and in synthesized form (Pan-sharpened, high-resolution color image). Images have good decoding properties. If there is a qualitative Digital Model of Relief, they can be considered as an alternative to aerial survey to update the maps scale up to 1: 2000.



QuickBird (RGB, GOOGLE-1 meters per pixel) – 2012 y.

QuickBird (RGB, GOOGLE-1 meters per pixel) – 2012 y.

Figure 3.Space image of QUICKBIRD satellite system

The processing of remote sensing images of the area under investigationto study land degradation (one should remember that the images were taken in the interval of several years) was started with a linking of the image, i. e., with definition of geographical location of the area reflected on it using a topographic map. Having made the linking, we proceed to our own interpretation of the image. The process of interpretation includes the detection and identification of decoded objects and is carried out according to decoded characteristics.

When decoding satellite images, first of all, the fact that top-soil can be depicted on satellite images – directly – in case of plowing up the territory and – indirectly – through the image of forest, natural grassy and cultivated vegetation, was taken into account. Various plant associations were distinguished in the images by tone and pattern (texture) of the image. The tone of the vegetation image was significantly influenced by spectral brightness, texture of vegetation and projective cover of soil surface.

Further, a detailed analysis of decoding index of plant cover is given. NDVI (normalized difference vegetation index) is the most famous index, it is easy to calculate, it has the widest dynamic range amongfrequently used vegetation indices, and the best sensitivity to changes in plant cover in GIS. Calculationformula for the vegetation index is a ratio of the difference between red and infrared channels to the sum of these channels. It is moderately sensitive to changes in soil and atmospheric conditions.

$$NDVI = (NIR-Red)/(NIR+Red)$$

where NIR, Red – are the reflections in the near infrared and red regions of the spectrum, respectively. NDVI is an excellent indicator for assessing the state of vegetation and is one of the most commonly used indices for solving problems in the quantification of plant cover. The calculation of NDVI is based on two most stable (not dependent on other factors) regions of spectral curve of the reflection of vascular plants.In the red region of the spectrum (0.6–0.7 μm) is the maximum absorption of solar radiation by chlorophyll of higher vascular plants, and in the infrared region (0.7–1.0 μm) is the region of maximum reflection of the cellular structures of the leaf. That is, high photosynthetic activity (associated, as a rule, with dense vegetation) leads to less reflection in the red region of the spectrum and to greater reflection – in the infrared. The use (instead of a simple ratio) of a normalized difference between the minimum and the maximum of reflections increases the accuracy of the measurement, reduces the influence of such phenomena as differences in image illumination, cloudiness, haze, radiation absorption by the atmosphere, etc. [7].

According to the data of QUICKBIRD satellite of the western branches of the Chatkal ridge, a preliminary classification was conducted by six main classes. The classification was made in order to find data that corresponded to any criterion of bare plots and properties. It is known, that classification is a process of sorting out (distribution by classes) of image elements (pixels) into finite number of classes based on their attribute values (DN – digital numbers).If a pixel satisfies a certain classification condition, it refers to a specific class that corresponds to this condition. As a result of using the classification, a set of brightness values corresponding to the input data is obtained, and an image is obtained, an example of which is shown in Fig. 5, the classification table (the so-called signature) is also presented. The signature is a collection of data that determines the brightness values of the pixels of a particular class group.Values in table columns RED, GREEN, BLUE characterize the brightness of pixels in this class on the corresponding channel (red, green, blue). In the course of the study, the main soil-protective features of plant associations are given, as well as their approximate indicators. It was stated that for herbaceous phytocenosis, the main features of soil protection capacity are: the ratio of the projective cover of the grass and the true turf, the presence in the herbage of plant species belonging to various erosion-resistant groups by the type of root systems, and the current state of phytocenosis.

For woody and shrubby vegetation, the main signs of assessing the soil protection capacity are: the closeness of tree crowns and shrub layers and the state of the forest bedding and soil cover.Brown leached soils located in the most moistened, shady areas with lush vegetation prevail in this area.Vegetation is of meadow-steppe type, with a lot of herbage and shrubs, in some places – juniper, spruce, apple, and walnut trees standing separately. In this area an almost intact vegetative community is observed with good soil protection ability. The highest percentages of the projective cover are characteristic for high turf. High-resistantand medium-resistant species are found in the grass. Communities of this category do not need special measures for restoration (except in minor insolated eroded slopes).The only thingrequired – is a rational use. From the above we can say that the soils distributed on the shadow slopes, with the exception of eroded differences, always have a powerful fine-grained cover, which does not contribute to the formation of surface runoff. Therefore, these plots are the best lands in mountainous areas. In the area where brown typical soils at an altitude from 1300 to 1600 m above sea level are widespread, large-cereal-shrubby vegetation with shrub thickets, archa, deciduous mesophilous vegetation – walnut, apple, etc., is growing.In this category of land, plant communities with insignificant signs of damage are widespread: a reduction in turf percentage (with sufficiently high projective cover) and the introduction of low-erosion-resistant species. There is also a weak evidence of erosion processes (with the exception of eroded insolated slopes). These lands require partial surface improvement with usage regulation. Vegetation of this category requires partial reforestation measures aimed at increasing the closeness of crowns and the restoration of wood bedding, as well as favorable conditions for natural renewal of woody vegetation.

In the area where brown carbonate soils prevail in the lower part of the belt of mountain brown soils and at an altitude of 900–1300 meters above sea level, a decrease in the value of all the indicators is characteristic: further lowering in the percentage of projective cover and turf, mainly medium and weakly erosion-resistant

species in the grass stand. This calls for continuous surface improvement of plant cover with usage regulation. Plant communities need protection, continuous reforestation measures and promoting natural regeneration.

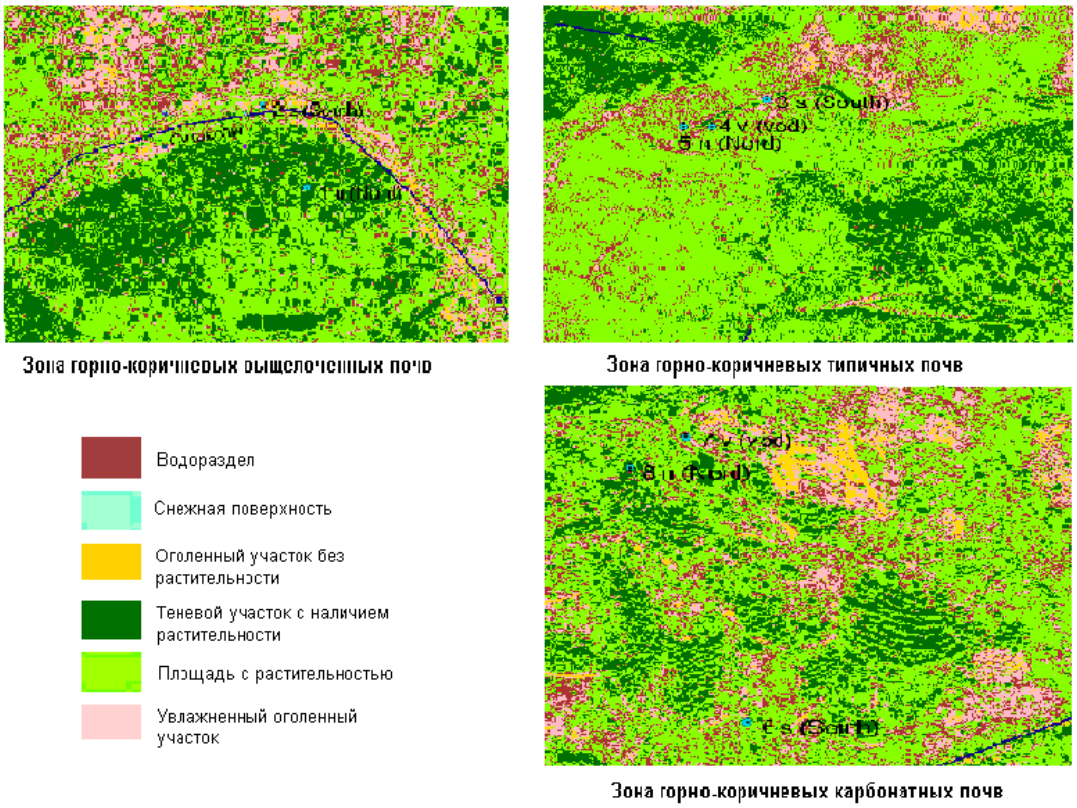


Figure 5. Map of calculating the vegetation index NDVI of the territory of the Western branches of the Chatkal ridge (by zones)

Clustering of data on the territory of the Jizzakh steppe began with arbitrarily given values (average) or mean values taken from existing signatures. After assigning all possible pixels to one of the classes, the class centers shifted, and the process wascompletely repeated (the next interpretation). The process continues until the maximum number of interpretations is reached or the maximum percentage of pixels that have not changed their class is reached (convergence threshold). Landsat images obtained served as the main source of high-resolution images for detailed studies of plant cover change. After decoding the image, it could be definitely said that, for example, the vegetation of the territory under study was undeveloped in 1980, as the NDVI index of territory vegetation was 25–30%. In 1989, with the development of this territory, this value rose to 87%, which is due to soil melioration during this period.In 2000, the NDVI index of vegetation dropped to 78%, and in 2009 to 73% due to soil salinity; so, the rate of vegetation degradation grows with deterioration of agrophysical, agrochemical properties and melioration state of soils in area under investigation. High resolution images show many features, such as different conditions of vegetation, barren areas formed as a result of cattle overgrazing.

Besides natural conditions that determine the nature of the plant groupings of the described area, economic activity of a man has a great impact; it changes the natural relationships of plant groupings due to centuries-old use of the territory as pastures, felling perennial plants for fuel, and plowing for growing grain crops. Thus, the degradation rates of plant cover of the area under study are determined by the following criteria: degradation of steppe lands (increase in degraded zones), reduction of fodder reserves in the area under study, deforestation of tree and shrub plants.

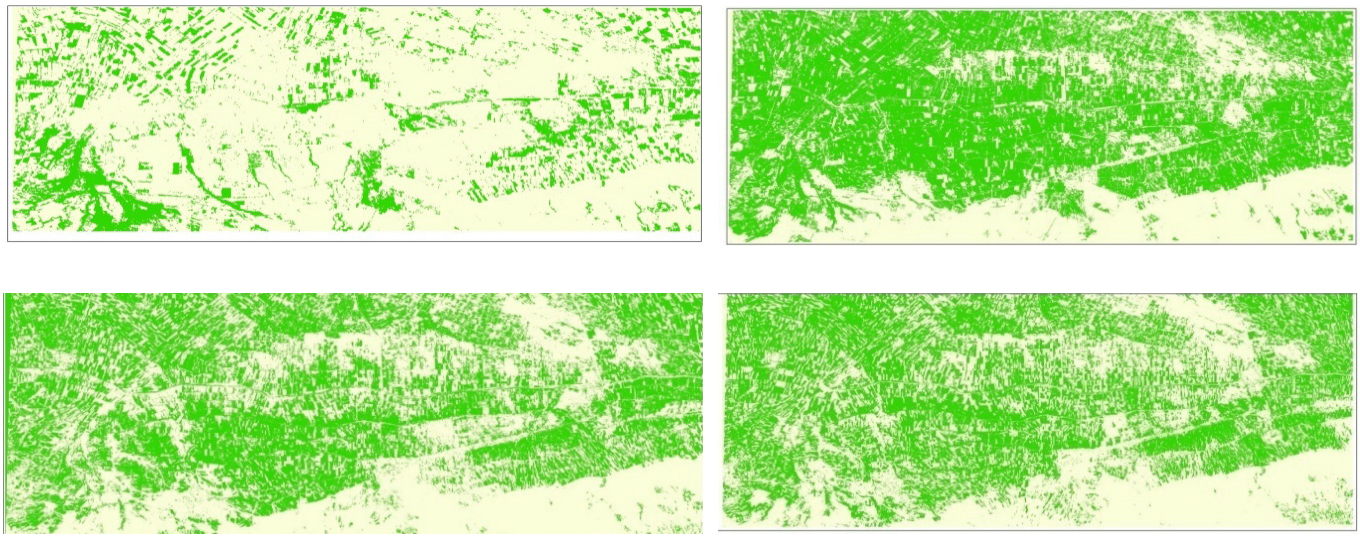


Figure 6. Map of calculatingthe vegetation index NDVI of the territory of the Jizzakh steppe

Proceeding from the above, it can be said that the creation of databases on plantcover with the use of processing remote sensingmaterials on the basis of special software ofgeoinformation systems provides a detailed spatial assessment of plant cover in various scales, including an automatic mode, and this, in its turn, will allow more correctly identify the main damagefocusesin degradation processes.

The obtained materials on areas under study after the processing of remote sensing images based on GIS technologies can provide information on the actual state of the region's lands, top-soil cover, land degradation risks; this information makes possible to developthe algorithms for analyzing the suitability of lands for agricultural crops, the algorithms for assessing degradation risks, and to develop the technology of results optimization and assessments in the form of a series of optimal ecologically and economically sound scenarios for the allocation of lands and agricultural crops, forconducting soil-protective measures.

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THE ROLE OF LAND MANAGEMENT IN ORGANIZATION OF RATIONAL USE AND PROTECTION OF LAND RESOURCES

Abstract: The article examines the role of land management in the organization of rational use and protection of land resources in conditions of irrigated agriculture.

In the conditions of a market economy, the republic faces a difficult task: to organize the use and protection of natural resources, including land, so that on the one hand, the processes of deterioration of the fertile soil layer, land degradation, restore and improve them, and, on the other hand, achieve increase the efficiency of agricultural production through the proper organization and conduct of rational land tenure and land use.

Keywords: land plots, erosion, agrotechnical, forest-meliorative, hydrotechnical, sprinkler technology, irrigation schemes, groundwater salinity, methods of drainage.

It has been proved by practice that the tasks set can be solved with the help of many measures, including land management, the main purpose of which is to organize the rational use and protection of lands, create a favorable ecological environment, improve natural landscapes and implement the tasks set by the land legislation documents.

It is known that in the course of design and survey works on land management, such an organization of the territory is formed, which corresponds to the current level of development of production (land) relations and productive forces in various subjects, i. e. in specific organizations, enterprises, institutions or households, which is common to all land management projects. At the same time, in areas with developed water and wind erosion of soils, the organization of the territory must be anti-erosion, which requires land management support for the design of a complex of anti-erosion measures: organizational-economic, agrotechnical, forest-meliorative, hydrotechnical.

In this regard, the boundaries of land plots are designed taking into account the terrain; select the appropriate structure of sown areas, introduce soil protection rotations; conduct inside the field device of the territory with the placement of separately processed working areas, forest belts, erosion hydraulic structures, roads and introduce contour processing of soils; plan erosion control of the territory of fodder lands.

In areas where intensive work is carried out to irrigate land massifs, crops, technical measures to develop new lands and improve soil fertility, the organization of the territory planned in the course of land management should take into account the regulatory requirements for the placement of irrigation and drainage channels, the irrigation schemes used (open method and sprinkling), types and types of sprinkler technology, methods of drainage, land reclamation or improvement of land plots, etc.

In areas where there is radioactive contamination of the territory, and land pollution production of waste and other substances and compounds, in the course of land management and address the issues of purification of soils, restoration of their original properties or conservation of land, plan the organization of the territory, which contributes to reducing the negative impact of pollution or contamination at obtained in the course of agricultural production products.

The organization of grounds and crop rotations is one of the main components of the project of intraeconomic land management of agricultural organizations and households in areas of irrigated agriculture. In the organization of land and crop rotation definitively set the boundaries

of irrigated lands, determine the area irrigated and rain-fed land, size of irrigated crop rotation, placing them, tracing the permanent on-farm (group) the valves supplying water to crop rotation areas and grounds.

At this stage of the project agree on the boundaries and area of rotation with boundaries and space that was previously allocated for surface irrigation. In the process of organizing the fields and crop rotations determine:

• economic the purpose and use of each plot of land;

• the intensity of use of certain types of land and land plots;

• the crop rotation system, improvement and conservation of land, conservation and reproduction of soil fertility, reclamation, conservation and erosion control planning area;

• regulations, modes and types of permitted use of each plot, the system of water use for each land and crop rotation.

Under the organization of land and crop rotations imply the establishment of a reasonable composition ratio, the economic expedient of stationing and differentiated use. This involves the solution of the following inseparable elements of the project:

• establishing the composition ratio (structures) land, regime and conditions of their use;

• transformation, improvement and occupancy of the land; organization of a system of crop rotation.

The main objective of the organization land and crop rotation – improving the intensity and revealing of reserves of growth of efficiency of use of land and irrigation water on the basis of the economic interests of landowners and land users. It is necessary to strictly comply with environmental requirements, as otherwise, will decrease soil fertility, to develop the processes of irrigation erosion, degradation, salinization.

Organization of land and crop rotation is crucial in the projects of farm land, as this composite part determined by the direction of the use of land and irrigation water, the irrigated areas of placing and dispensing irrigation moisture. Irrigate all suitable for this purpose, land – cultivation, long-term plantings, pastures and hay fields located in areas command economic or efficient allocators supplied with irrigation water, which is a limited natural resource. Quantity limit-setting composition, the type and area of irrigated land. However, proper use of irrigation water depends on the reasonable organization of land and crop rotations.

• Here are developing a system of irrigated and non-irrigated lands and crop rotations to determine their spatial arrangement and transportation of irrigation water, establish the amount, manner and time of filing. The irrigation water influences the organization of land and crop rotations using the conditions of its delivery to the place of consumption the plant root system. This is reflected in the economic and technical requirements for distribution through on-farm canals, pipelines on the territory of crop rotations and grounds. In the organization of land and crop rotations in the farms of irrigated agriculture, there are new requirements related to the design of irrigation systems, proper irrigation water use, irrigation network and water supply of crops. Therefore, in addition to place on-farm irrigation network (group of valves) and develop a water use plan.

• comprehensively. On the organization of land and crop rotation, located on the irrigated lands have an impact:

• terrain, slope, slope exposure;

• number and sizes suitable for irrigation sites;

• remoteness and ease of location of the irrigated plot relative to water sources and irrigation channels, settlements;

• granulometric composition of soils, permeability of soils;

• the groundwater level, forecast to rise with regular irrigation;

• groundwater salinity, salinity of soils;

• settling of soil;

• technical and economic requirements for placement;

• internal valves, zone command;

• organization of the revolving (rotary) to use waste water for irrigation of additional areas;

• the possibility of irrigation with effluents of livestock farms.

In the organization of land and crop rotation in areas of irrigated agriculture to solve the following tasks:

1. Establish zones command valve manifolds.

2. Refinement of irrigated and rain-fed arrays of transformation and improvement of land.

3. The definition of types, types, sizes, rotations, schemes crop rotations in them.

4. The negotiation of boundaries and areas of field crop rotations with borders and sizes of the irrigated plots.

5. The location of the irrigated and non-irrigated crop rotations.

6. The location of the valve manifolds supplying water to crop rotation arrays.

To solve these tasks, the engineer-land surveyor you must have the following additional data:

– the contract of water use zemleustroistvo management;

– the scheme of reconstruction of the irrigation network, the composition of irrigation events irrigation in zemleustroiteli agricultural organization or enterprise;

– statement of the distribution of land zemleustroistvo farms in zones with different regime of irrigation (for water allowance areas);

– recommended water allowance for each district the number standards, the timing of irrigation.

Constant concern about environmental protection and best use of land resources will contribute to the creation of the most favorable, healthy conditions for living and recreation. Its vital functions, especially the production people has a big impact on the natural environment, vegetable and animal world, water, air, soil, terrain and landscape. This influence can be negative, causing depletion of the natural environment and deteriorating health conditions, and positive, consisting in the restoration and enrichment, and conversion.

If the minerals are eventually exhausted, and irreplaceable, natural resources, including land, if properly used, is practically inexhaustible. The natural environment is a very broad term. These include: land and water, atmosphere and biosphere, soil and subsoil, etc. In every natural environment there are certain processes associated with human activity, so in a period of scientific and technical progress, when the degree of human impact on the natural environment is expanding, with the increasing use of land resources, and increasing responsibility for their safety, the appropriateness of the current reforms.

Problems of protection of land and improvement of land use covers a wide range of issues and activities, some of which can be solved within the boundaries of the whole country, others within the borders of administrative districts, farms, or individual zones [1, p. 43]. However, the correct General solution of these issues will not improve the land resources use and their protection in a certain small area.

Currently, the government of the Republic of Uzbekistan to the land management service raises the question of the development of measures for land protection and rational use of natural resources, schemes of land management of the districts and regions.

According to prof. S. N. Volkov it is necessary to take into account the fact that in the preparation of schemes, not all issues can be resolved in detail, because the schema is the product of the preliminary surveys and preparation of these schemes makes it impossible to reach every farm [2, P. 249].

The range of issues addressed in the development of measures for land protection and improved land use, depending on the specific natural and economic conditions, should cover not only the rational use of land and water resources and their protection from pollution, clogging and depletion; protection and creation of parks and protected areas, forests, scenic areas, flora and fauna, places of rest and treatment and protect them from pollution and many other consequences.

In the opinion of prof. A. A. Varlamov [3, P. 122] timely and qualitative implementation of mandatory measures to improve land and protect the soil from wind and water erosion, salinization, water logging, flooding, desertification, desiccation, overconsolidation, littering, pollution and preventing other processes that degrade the quality of land and cause their degradation.

As we know the natural environment of the Republic is not the same everywhere. In some places it is very rich, in others less, in the third quite poor.

Enriching can be done by restoring and creating new forest areas, forest parks system for various purposes, systems of the green areas around settlements and within the settlements, industrial areas and industrial complexes of agricultural enterprises, along roads and canals. Enrichment of the natural environment will also contribute to the creation of artificial waterways and improving the use of existing ones.

All these raised in the article the issues are relevant at present, especially in the irrigated areas of Uzbekistan. As you know the further rational use of land in agriculture is impossible without intensification, and it is associated with irrigation, reclamation and chemicalization.

The waste water coming from agricultural land into water, will contain a large number washed out of the soil of natural salts. And also residues of fertilizers and pesticides,

which, gradually accumulating in water bodies, they interfere with the established biological and hydrochemical regime and significantly impair the water quality and the conditions for the existence and development of such promising areas of farming like fisheries management. The elimination of this drawback in full or in part may be carried out by the relevant organization of the territory. Issues of planning in a mixed economy obtains current values.

In recent years, the country is significantly developing ecotourism. Many people spend their holidays in nature near the banks of rivers and lakes, surrounded by forests, located on tracts of land. The lack of special places for Parking vehicles and setting up tents leads to the fact that large areas of the coastal zone of rivers and lakes polluted. Besides illegally felled trees and shrubs. To prevent these and other undesirable consequences, it is necessary in projects of inter-farm land set aside special areas for these purposes and to establish procedures for their use.

From the content of the above-listed activities on conservation and improved use of land resources it can be concluded that many of them are directly or indirectly related to the organization of the territory is not only large tracts of land, but within the boundaries of individual farms. This does not exclude, and assumes the appearance of needs and a number of other events as legal, organizational, technological and other character associated with creating the most favorable conditions for work., life and recreation in the city or town and in the countryside.

Therefore, in our view, at this stage of development land development measures for the conservation and improvement of land resources should be an integral part of all land development projects. The detail and depth of these issues should be determined by specific conditions and objectives.

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THE ENERGY-EFFICIENT MOBILE DEVICE FOR GRAIN DRYING

Abstract: in the article given the short review of drying units and described the offered new energy saving up mobile device for drying of grain crops. It is displayed joint applications of two methods of drying of a grain: absorbing and convective. Adducted basis parametres of the device and calculations for power savings of process of drying in the device. It is displayed improvement of physical properties of separate grain crops conducive to power savings of process of drying at use of the given device. Possibility of application alternative to energy for process of drying and advantage of the given device is reduced.

Keywords: energy-efficient, the drying device, flowability, porosity, heat conduction, thermal diffusivity, hydraulic conductivity, the reducer, a muff, a belt transmission, a gutter, the screw.

Intproduction

Drying-it the most widespread master schedule. In our country for drying of grain crops spend about 300 thousand tons of fuel. As grain drying is the most power-consuming technological operation working out of new drying units, methods of their perfecting and efficiency heightening has an important economic value. As it is known, in fresh-cut a grain proceeds process post-harvest ripenings. Correctly picked up process of drying of a grain promotes alignment of damp and degree of a maturity of grain mass, improvement of appearance and technological properties of a grain [1].

In last years in our country after harvesting wheat are sowed crops (rice), leguminous (bean, golden gram) crops-leguminous (maise) and oily (sunflower, peanut) cultures and turn out big crops. Harvesting of such cultures to have in the autumn which drying at lowering of air temperature, cloudy and rainy weather is a problem. Thus, acute necessity on grain drying devices is observed. To a member of a farm having about 500 kg dry up a grain product (rice) not favourably from the economic point of view to use dryer grains with capacity 5 ton/hour which spends material means on 80$/hour. Material expenditure on transportation to a stationary drying unit besides, is required. Therefore, considering local conditions it is required mobile, economic drying devices.

Materials and methods

Offered the device treats with us to agricultural technicians, rice, a peanut, sunflower, etc. in farmer, private enterprises can be applied to drying of products of grain

crops as. A device problem is heightening energy-efficient process of drying and quality of an exsiccated product, security use of alternative energy for architecture of process of drying on the remote districts from the farm electric power line.

It is known various aspects drying devices for products of grain crops. The drying device for grain XLM 350 has a principle of a recycling [2]. Capacity of drying more than 300 m^3/days, overall dimensions 4040 × × 5400 × 8700 mm, power of the electric motor of 75 kw. The high cost price of the device has.

Drying devices series MHTD approaches for maize, wheat, rice, with power of 2400 tons/days, and series MHTY approaches for a soy, colza, peanut, with power of 5000 tons/days [3]. The big overall dimensions and the high cost price have these devices.

The device for grain drying model WGH has of brands 100, 200, 300, 400, 500, 600, 700, 800 which are grounded on a convective mode of drying [4]. The device height reaches from 6 meters to 20 meters. In the device the temperature of an exsiccated product reaches 55° C that is to inadmissible values for separate grain (for example, for rice).

The mobile drying device of bunker type С3П-32 has a principle of cyclic character [5]. In the given installation at maintenance are used extras means, has the big overall dimensions (8000 × 3200 × 7550), the big mass (4400 kg), high power consumption (60 kw).

In the drying device of bunker type CM-1 the exsiccated product is transmitted from a hopper to the bunker [6]. The device has high efficiency (120–170 tons/day), however has the big expenditure of diesel fuel (80liter/hour).

The mobile device for drying of grain products has the nutritious bin fixed on the screw which is at an angle to horizon and has the foundations [7]. The flute is attached to the screw and fixed section. The drier drum which has regulated a slot is attached on the trailer and located at an angle to horizon. Under an adjustable slot installed the sorting gear, under which there is a container for dried a product. Aside the upper part a drier drum located the fixed section, which has the ventilator and a calorifier. The drier drum drive gear consists of the electric motor, the reducer, a clutch. The drive gear of the screw conveyor consists of the electric motor and a belt transmission. For security of the mobility the device it is installed on the trailer. However there are rather big losses of heat in the drier drum what to lead to an excessive energy consumption.

In the offered device the convective mode of drying [8] is applied, therefore under recommendations reduced in operation [9] is planned feeding of warm air on a grain current. In given the device the problem is executed thus: For drying the certain portion of an exsiccated product of grain crops undertakes. Due to portion, pleiocyclic drying it is ensured uniform mixing an exsiccated grain which is carried out by means of two screws and the drier drum which result to serve for uniform drying of a grain. Uniformity of drying grain, ensures qualities of a grain at its further processing. For example, at rice processing (unrefined rice) after defined dry up is exposed to machining job ergo turns out refined rice. Deriving of a qualitative product immediately depends on homogeneity of an exsiccated product.

Results

The device for drying of products of grain crops (fig. 1) contains the nutritious bin 1 fixed on the screw 2 which has a drive gear consisting of the electric motor 3 and belt transmission 4. The screw to be under a certain edge to horizon and has the foundation. The bin of a time delay 5 is fixed on the screw 6 having drive gear the electric motor 7 and a belt transmission 8 which is under a certain edge to horizon and has the foundation. The gutter 9 is attached to the screw 8. Fixed section 10 has the foundation and contains the ventilator 11 and a calorifier 12. The Drier drum 13 having a foundation is located at an angle to the horizon which drive gear consists of the electric motor 15, the muff 16, the reducer 17, the muff 18 and the slot 14 for grain release. The special gutter (the sorting gear) 19 has the foundation and a drive gear consisting of the electric motor 15, a belt transmission 20. The vessel for dried grains 21 is under the sorting gear. The bin of a time delay 5 has a lock 22. The cyclone 23 has the foundation which drive gear consists of the electric motor 24 and belt transmission 25 and has pipe ducts 26, 27 and 28. The pipe duct 26 has conoidal a tip the enveloped mesh which is in the bin of a time delay 5. The pipe duct 27 is under the bin of a time delay 5. The pipe duct 28 is over special gutter (the sorting gear) 19. The drying device is fixed on the trailer 29. Dual-circuit solar water-heating installation 30 is located sideways, and the solar photo-electric battery 31 from above (fig. 3).

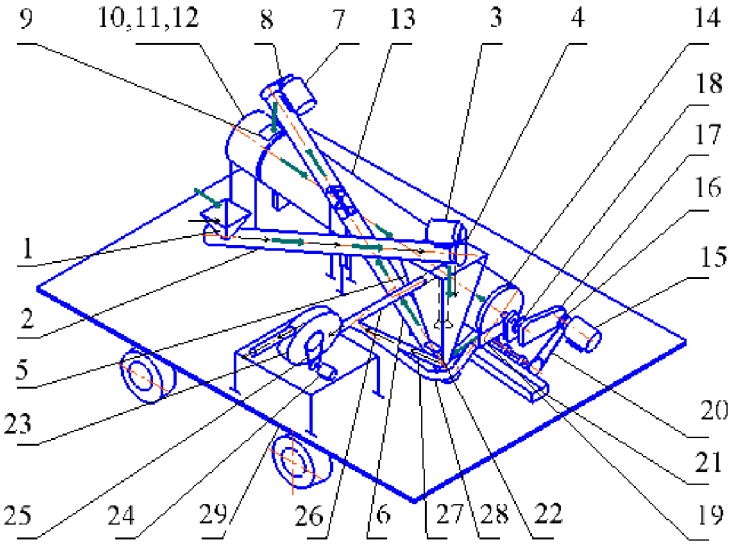

Figure 1. The mobile device for grain drying

Figure 2. A rice rind

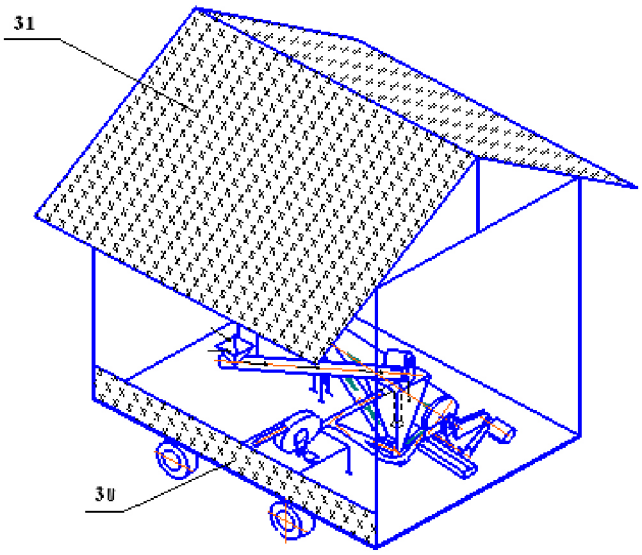

Figure 3. An aspect of the mobile device for grain drying

Discussions

In the device for drying of a grain the power savings increase is reached following manner:

Cheeseparings of machining job of rice (unrefined rice) is a rind of rice, which utilizable. In the work given the rind of rice as a sorbent (fig. 2) is used. Amounts of a used sorbent in the course of drying it is defined by expression:

$$m_{sor} = 0.3\ m_{gra}$$

Where, m_{gra} – weight of an exsiccated grain, kg;

Sorbent provides moisture removal on 5% from mass of an exsiccated grain. Amounts of a portion of an exsiccated grain are made by 150 kg. It is known that the average value of expenditure of warmth for evaporation of a moisture makes of 1 kg nearby 6000 кJ. Thus, the sorbent ensures energy sawing following amount of warmth at capacity of drying of 150 kg/h:

$$Q_1 = 7.5 \cdot 6000 = 45000\ \kappa J = 10748.06\ kcal$$

Sorbent application allows to save energy:

$$N_1 = 10748.06/860 = 12.5\ \kappa W \cdot h$$

In the drier drum it is ensured moisture removal grains about 4%. An external surface of the drier drum it is coated by a heat-insulating composite material which prevents heat losses on 20% therefore it is reached following power savings of amount of warmth:

$$Q_2 = 1.2 \cdot 860 = 1032\ \kappa cal = 4320.8\ \kappa J$$

Amounts of the saved energy:

$$N_2 = 1.2\ \kappa W \cdot h$$

Thus, a general meaning of power savings of amount of warmth equally:

$$Q = Q_1 + Q_2 = 11780.06\ kcal$$

General meaning of amount of the saved energy at capacity of drying of 150 kg/h equally:

$$N = N_1 + N_2 = 13.7\ \kappa W \cdot h$$

In a current of process of drying of rice in the device physical properties of rice as porosity, flowability, an angle of slide, a thermal capacity, heat conduction, diffusivity and hydraulic conductivity are examined. At rice transiting through the screw observed breakage a bough of rice. As a result of breakage a rice bough has decreased porosity that has augmented a flowability value. The flowability increase has led to reduction of an angle of slide of rice. It is known that flowability and angle of slide has a special value in the course of processing of a product of grain crops. Besides, porosity lowering has led to reduction of air spaces between pellets of grain mass that is the favorable phenomenon. It is known that air is a bad conductor of heat, temperatures, a moisture and has rather great value of a thermal capacity. Porosity lowering has led to increase in a value of heat conduction, thermal diffusivity, hydraulic conductivity and to reduction of a value of a thermal capacity. It is known that demanded amount of warmth for drying directly proportional to a thermal capacity. Thus, has decreased demanded amount of warmth that is the answering purpose.

In given the device for pellet drying it is provided use of alternative energy which creates possibility architecture of process of drying on places where is not available current lines. For a hot-air heater the double-loop solar heating plant with a tank the accumulator is used. For deriving of electric energy the solar photo-electric battery into the square 30 m^2 is placed. Considering that, using 1m^2 the solar battery it is possible to receive on the average 200 W electrical energy in the given construction possibility of deriving of 6 kW electrical energy is created. For execution of process of drying the value demanded electrical energy in the device has:

$$N_{dem} = N_{m.3} + N_{m.7} + N_{m.11} + N_{m.15} + N_{m.24} = 0.75 + 0.75 + \\ +0.2 + 0.55 + 1.1 = 3.35\ kW$$

Where, $N_{m.3}$ – the screw electric motor.

$N_{m.7}$ – the screw electric motor.

$N_{m.11}$ – the hot-air heater electric motor.

$N_{m.15}$ – the drier drum electric motor.

$N_{m.24}$ – the cyclone electric motor.

Thus, the amount electrical energy received by means of solar batteries is sufficient for execution of process of drying.

The device for drying of products of grain crops (fig. 1) has next sizes: – diameters of screws of 250 mm, – length of screws of 2700 mm, – angle of screws to horizon 60°, external diameter of the drier drum of 880 mm, – length of the drier drum 2000 mm, drier drum angle to horizon 20°. Turnovers of shafts of the screw of 94 rpm, a turnover of the shaft of the drier drum of 15 rpm, a turnover of the shaft of a cyclone of 2900 rpm. Device overall dimensions 4000 × 3000 × 25000 mm. Power consumption N=3.35 kw, voltage 380 V, a frequency of 50 Hz, all ≈ 440 kg.

Conclusion

The offered construction of the device for grain drying has following advantages:

– As a sorbent the withdrawal of processing of crude rice (a rice rind) is used, expenditure on a sorbent thus drying cost is not required remains invariable;

– Use a rind of rice in the form of a sorbent leads power saving process of drying of a grain;

– Application in given device the bin of a time delay of a grain creates applications a drying mode witgh sorptive medium;

– Provides uniform mixing, hence what to serve for grain improvement in quality at the further processing;

– Application of a composite material for the drier drum to lead to improvement of power-economic indexes of process of drying of a grain;

– Use of solar batteries and a double-loop heating plant creates possibility of realisation of process of drying in district where there are no current lines;

Thus, distinctive signs of the offered invention are essential, are necessary and a sufficient condition for the decision of tasks in view. The offered construction is efficient, simple in the realisation and can be put, as in the fundamentals of creation of new highly effective, power saving up drying units.

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TECHNIQUE OF INDIUM METAL-PHOSPHIDE CONTACTS PERFORMANCE ENHANCEMENT BY MEANS OF CHEMICAL TREATMENT

Abstract: It was established that chemical treatment affects stoichiometry of the indium metal-phosphide surface, thickness and phase composition of native oxides. To obtain indium metal-phosphide contacts (M-n-InP), having nearly ideal characteristics, before metal deposition, one shall treat M-n-InP surface in HF, HCl, H_2SO_4, H_3PO_4 acid solutions. In this case, one shall give a priority to H_2SO_4: H_2O_2: H_2O solutions, giving minimum contacts parameters spread within the plate area. The same result may be obtained with the parameters of the contacts Au-n-InP, formed on the indium phosphide surface after treatment in HCI: H_2O and H_3PO: H_2O.

Keywords: metal, phosphide, indium, contact, semiconductor, oxide layer, dielectric, surface, density, layer thickness.

Studies of laminated multiphase structures are an important branch of chemistry, physics and semiconductor technique, being theoretical and technological fundament for development of discrete devices and integrated circuits. Enhancement of finished products quality and reliability requires comprehensive approach, covering all stages of device manufacturing. The characteristics of indium metal-phosphide contacts (M-n-InP) depend on the surface physical and chemical properties, which are to a large extent determined by pretreatment processes, affecting a surface stoichiometry, thickness and phase composition of native oxides. As far as chemical treatment is considered as the method of affecting, having the most evident impact on a surface condition, therefore, correct selection of the modes of conduction gain significant importance for semiconductors developing and forming of Schottky barriers with reproducible parameters.

Treatment in the solutions based on non-organic acids gives indium phosphide surface with minimum thickness of native oxide. In this particular case, it consists in a proximity of the values of an ideality factor n k 1.7; oxide layer thickness $d_{ok} = 0.5 \div 0.7$ nm and small difference of potential barrier values F_b^{ef}, found based on linear reverse current-voltage (CVC) and current-capacity (CCC) characteristics. At the same time, alkaline solutions H_2O_2: H_2O and Br_2: CH_2COOH leave on the treated surface quite thick native indium phosphide oxide (InP) $d_{ok} = 1 \div 2.5$ nm.

The contacts Au-n-InP, formed on the indium phosphide surface after such treatment, have the ideality factor (n) much exceeding 1.0. It follows, that when we want to obtain the contacts M-n-InP having nearly ideal characteristics, then one shall treat indium metal-phosphide surface in HF, HCl, H_2SO_4, H_3PO_4 acid solutions before metal deposition.

In this case one shall give a priority to H_2SO_4: H_2O_2: H_2O solutions, giving minimum contacts parameters spread within the plate area.

The contacts Au-n-InP, formed on the indium metal-phosphide surface after treatment in HCI: H_2O and H_3PO: H_2O, have also small parameters spread, when n is approximate to 1.0. But as opposed to H_2SO_4: H_2O_2: H_2O, after treatment in HCl: H_2O and H_3PO_4: H_2O we note much sharper drop of intensity of the edge photoluminescence of the chemically processed indium phosphide when it is subsequently treated at

T_{anneal} = 353 ÷ 523 K (Table 1). It is natural, that this can lead to increased parameters sensibility of the contacts M-n-InP, formed on the surface treated with HCl: H_2O и H_3PO_4: H_2O as compared to the treatment in H_2SO_4: H_2O_2: H_2, to the manufacturing temperature conditions.

As to the parameters spread of the contacts Au-n-InP within the plate area in the process of InP treatment in other solutions: Br_2: CH_3COOH, HF: H_2O, in our opinion, the main reason is the variation of native oxide layer thickness (NO) and of the interface phase composition, determining surface state energy structure. This conclusion is based on the observed discrepancy between the values n and F_b^{ef} of the contacts, formed in different points of a surface, when increase of the value n is not always followed by increase of F_b^{ef}, and vice versa, the contacts with the maximum value F_b^{ef} not always have very high values of n.

Table 1. – The effect of indium phosphide surface treatment on edge photoluminescence intensity

No.	Solution composition	Edge photoluminescence intensity, relative units			
		orig.	T_{anneal} = 353 °K	430 °K	523 °K
1.	Br_2: CH_3: COOH	0.1	2.7	3.3	1.5
2.	KOH: H_2O_2	48	0.2	0.1	0.2
3.	NH_4OH: H_2O_2	6.3	0.18	0.1	0.13
4.	H_2SO_4: H_2O_2: H_2O	23	17	10	14
5.	HF: H_2O	79	12	12	31
6.	HI: H_2O	105	11	19	46
7.	HCl: H_2O	79	13	11	8.6
8.	H_2O_2: H_2O	2.8	0.3	0.23	0.17
9.	H_3PO_4: H_2O	79	1.9	0.67	0.82

It should be recognized, that NO availability on indium phosphide surface is not always negative. When we analyze the effect of chemical treatment on U_{break} (breaking voltage), we can see that Schottky barriers with minimum NO thickness have also minimum U_{break}. At the same time NO formation between a metal and a semiconductor after InP surface treatment in such solutions as Br_2: CH_3COOH, NH_2OH: H_2O, H_2O_2: H_2O ensures significant increase of U_{break}. The absence of such effect when indium metal-phosphide surface is treated in KOH: H_2, which also results in formation of NO with a significant thickness, can be explained by the distinguishing features of the formed NO phase composition.

While analyzing electrical characteristics of the contacts Au-n-InP, one shall note the fact, that Schottky barriers, formed on the surface treated in alkaline medium (pH > 7), have lower temperature dependency I_s, which demonstrates reduced F_b^T of such contacts. In fact, after treatment in acid solutions (pH > 5), the value F_b^T of the contacts Au-n-InP, determined based on the dependency $lnI_s/T^2 = f(1/T)$, amounts 0.34÷0.44 eV, but after treatment in alkaline solution KOH: H_2O the value F_b^T of the contacts amount 0.2÷0.3 eV. Remember, that the value F_b^T in the indium metal-phosphide system is determined by defects energy structure, therefore this situation can be considered as one more evidence for the conclusion, that chemical treatment by means of selection of an appropriate etching agent composition, allows not only to control NO phase composition, but also at a large extent to control energy structure of the defects, affecting the value F_b^T. We can estimate the real processed based both on the change of edge photoluminescence intensity, which is quite sensitive, and on the rate of surface recombination, determined by surface conditions density and energy position. As one can see from the (Table 1), the values obtained after treatment in alkaline medium, especially with subsequent thermal processing at T_{anneal} = 353 °K, are quite lower, than after InP treatment in acid solution.

When we consider the model of surface conditions with continuous energy distribution (N_s), then this change N_s after treatment with alkali is consistent with the observed displacement of Fermi level of the surface within a single conduction band. We can also estimate N_s increase at the energy >1/2InP based on measurements of N_s (E_g) – Fermi level energy of a surface, using CCC of the structures with thin metal dielectric-semiconductor (TMDS) of the structures Al-n-InP, where in-

dium phosphide surface has been treated in NH_4OH solution before AI_2O_3 deposition [1].

Note, that the conclusion about the possibility to control physical and chemical properties of a surface, and, consequently, indium metal-phosphide interface parameters, absolutely complies with the modern vision of the processes, occurring at the solid-liquid interface and is in direct correlation with the effect of a solution pH on reductive-oxidative properties of the surface group of atoms and on NO concentration of induced conditions [2].

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THE INVESTIGATION OF IMAGE SIZES REDUCTION METHODS

Abstract: This article answer the question about the most effective algorithm for pre-encoded resize video frames to reduce the amount of data transmitted through the communication channels. An experimental study, in which the main criterion was the quality of reconstructed video frames, is described. There are also possibilities of many times applying the most effective resize algorithm are discussed.

Keywords: TV image, compression, redundant information, Lanczos, B-spline filter, video stream, resize, compression ratios.

The need for enhancing in the quality and quantity of TV programs significant increases within development of digital television processes. The number of transmitting programs of high-definition (HD) standards with a much larger amount of data is growing. Therefore, in conditions of limited frequency resource, it is possible to preserve image quality only by creating more effective methods of compressing TV images with high compression ratios of the video stream.

Compression of the video stream is affected by a number of factors. First of all, it is the presence of redundant information (code, structural, statistical, psycho-visual, temporal ones), the value of which depends on the structure of the video. So videos with a relatively homogeneous background contain a large amount of redundant information and are compressed better than videos with small details and significant brightness differences (Fig. 1). That's why poorly compressible video data is usually additionally compress by quantizer due to loss of some useful information, what significantly reduces the quality of images. Hence, we need more efficient coding methods to preserve the visual quality of TV images [1].

a) Compression in 25 times b) Compression in 3 times

Figure 1. The results of different structure images compression without loss of quality

One of the promising increasing data compression in TV approaches can be able a reducing the size of the original image before encoding and restore its size during decoding, i. e. if we reduce twice the number of pixels horizontally and vertically before encoding in the original image (Fig. 2), then the amount of its data will be reduced by 4 times and, accordingly, the amount of encoded image data will decrease.

Figure 2. The original, reduced and restored image of the video stream

However, we can irretrievably lose the part of useful information after the reduction of images size. It greatly affects the quality and intelligibility of the reconstructed images. Thus, the removal of individual pixels of fine-structure image elements leads to a significant deterioration in the quality of the reduced images, and hence, of the recovered ones [2]. (Figure 3) shows an original test image with a shallow structure and the result of twice reducing its size by simply thinning out the pixels.

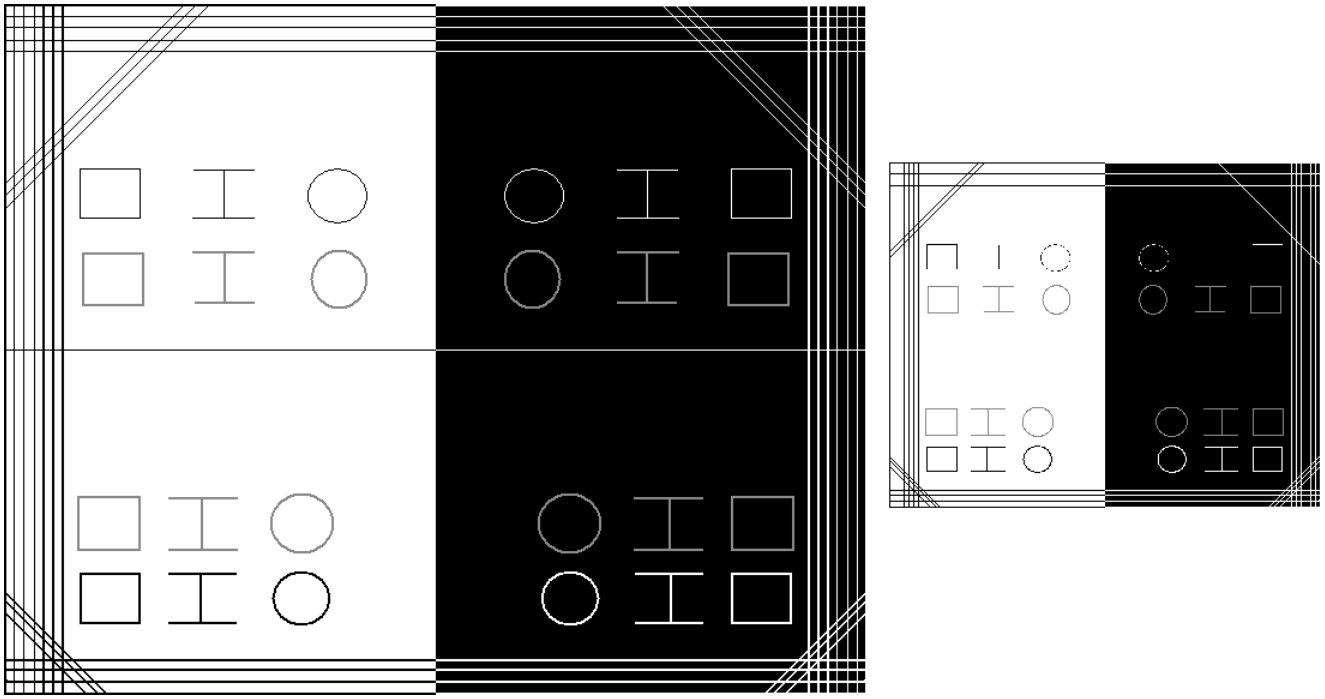


Figure 3. Test original and twice reduced by the thinning method images.

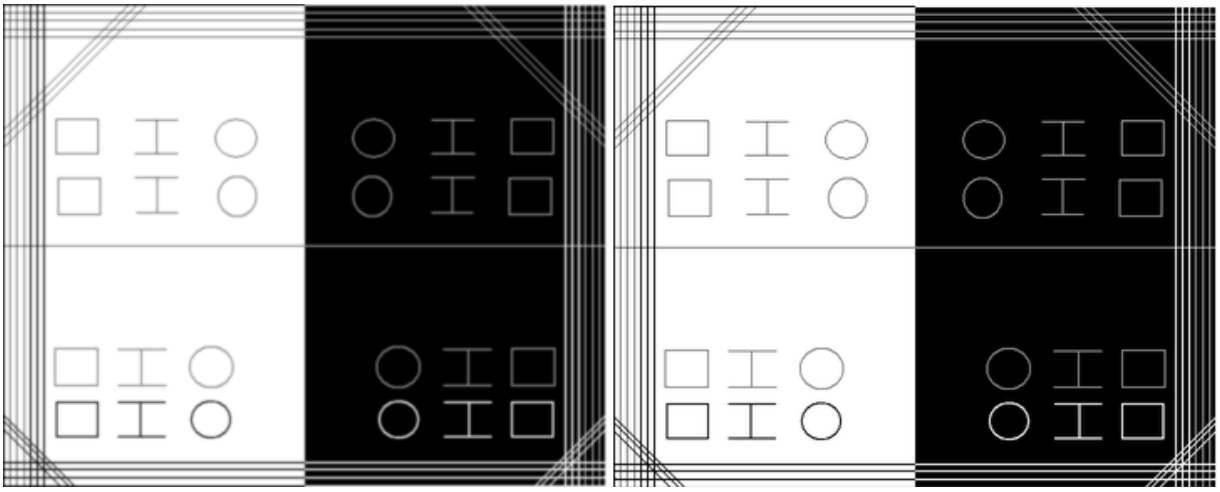
As we can see from the figure above, after thinning out pixels many thin lines of the test image are completely removed. So, in practice, more complex methods and scaling algorithms are used back better results.

Various interpolation methods can be used for this purpose: bilinear, bicubic ones, based on Lancsoz, Gauss, B-spline filters in Mitchell and Catmull-Rom variants etc. They are different in the computational complexity, the speed of processing, the accuracy of pixel recovery, the presence or absence of a metadata array etc. [3].

The aim of research was selecting the method that minimizes structural distortions into TV images after twice reduced with the best reconstructed image quality. The reconstruction was made by the bilinear, bicubic interpolation methods, B-splines, Mitchell filter and Lanczos filter of the third order (Lanczos-3). The special graphic and the real TV images were used.

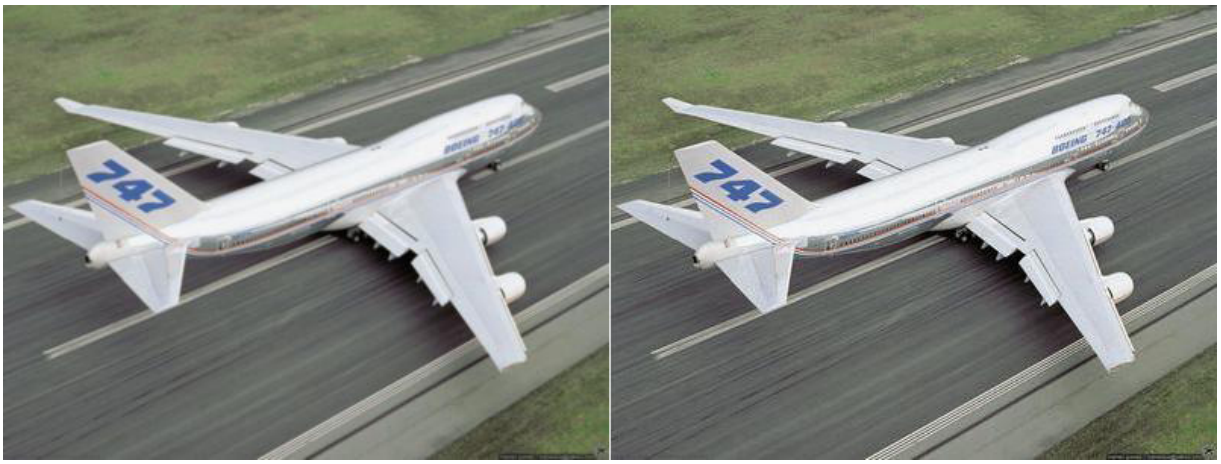
Based on the results of the studies, the Lanczos and B-spline interpolation methods provide the smallest distortions of fine-structure TV image elements. Other considered scaling methods provide less image quality.

In (Fig. 4 and 5) we can see reconstructed images after reduction by the methods of B-spline and Lanczos of the third order.



a) B-spline b) Lanczos-3

Figure 4. The quality of the reconstructed test image after twice reducing it with B-spline and Lanczos-3 methods



a) B-spline b) Lanczos-3

Figure 5. The quality of the reconstructed real image after twice reducing it with B-spline and Lanczos-3 methods

As can be seen from the results of the experiments, the scaling methods using B-splines and Lanczos-3 provide a sufficiently high image quality without noticeable structural distortions. B-spline method, based on the fourth-order piecewise cubic algorithms, practically does not change the image structure, but suppresses high frequencies, what leads to blurring of the image and loss of clarity. And the Lanczos method of the third order based on the window sine-filter, on the contrary, fairly well transmits the clarity of the image, but introduces some distortions and can create the Gibbs's effect.

Then, an additional study was carried out to evaluate the quality of TV images after a twofold reduction and increasing their size by the Lanczos method.

To evaluate the effectiveness of bidirectional image resizing we used 3 test images of different genres with different content of fine-grained elements. In the experiment each test image was first consistently twice reduced by the Lanczos-3 algorithm in along the hori-

zontal, vertical and the field, and then also restored to its original size. In this case, the evaluation of the quality of the reconstructed images was carried out both subjectively (Fig. 6) and by calculating the mean square error (MSE) of the pixel values of the original and reconstructed image (Fig. 7) [4].

Figure 6. The quality of the original and reconstructed TV image after bi-directional (the field) resize using the Lanczos-3 method

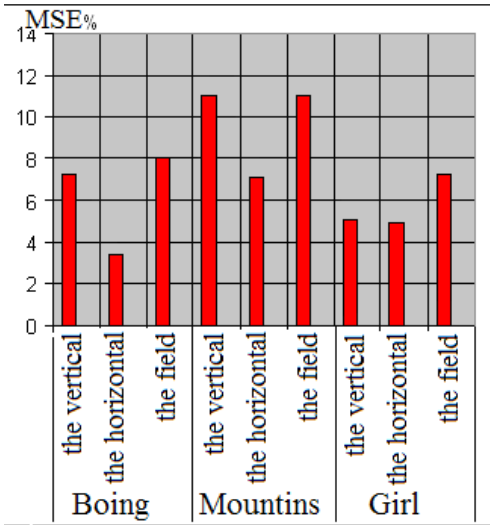


Figure 4. Histograms of introduced distortions when scaling test images using the Lanczos-3 method

As we can see from the results of the experiments, the Lanczos method shows good efficiency. So even on fine-grained images the visual degradation of quality is practically unnoticeable, and the objective estimation of distortions doesn't exceed 11%, which is quite good result. Thus, the application of the Lanczos method may allow increase the efficiency of video streams compression of TV programs.

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APPLICATION OF THE ABC CURVE IN THE STOCK MANAGEMENT OF MEDICINES FOR TREATMENT OF ONCOLOGY IN A HOSPITAL OF HIGH COMPLEXITY IN TERESINA

Abstract: Due to the intensification of the market race, managers are constantly in search of methodologies and management models that best meet the needs of the company and the clients, in this case generating competitive advantage. In this context, inventory management offers tools and methods that help ensure a satisfactory level of service and low logistic costs, including the ABC classification. In view of this, this study aimed to analyze a specific group of medications that presented inventory movement in the 18-month interval, in a hospital of high complexity in Teresina, Piauí. Through the ABC classification, two alternatives were used to work with the classification, which should be aligned according to the strategic planning of the company, providing the level of service desired and optimization of logistics costs.

Keywords: ABC Curve, High Complexity Hospital, Stock Management, Medicines, Oncology.

Inventory management, which interacts directly with transportation and warehousing, is a fundamental function of integrated logistics, which is divided into inbound logistics (supply management and supplier relationship), industrial logistics (planning, scheduling and production control) and outbound logistics (physical distribution of products and customer relations). Thus, an efficient inventory management allows the desired level of service and minimum logistic cost [5].

In hospitals, there are several types of medicines, with varied demand, for various purposes and of varying prices, so keeping stockpiles of them is a rather arduous task, and if wrongly controlled, it can generate unnecessary cost for the hospital. In this way, the ABC classification appears as a crucial tool for these businesses because, in addition to being drugs that usually have high costs, the consequence of their lack in stock can be disastrous for the hospital image. The ABC curve, if performed correctly, allows management to determine adequate levels of inventory and control procedures [7].

Given the complexity and importance of administering a hospital's stock of medicines, we ask: **How is the ABC Curve method for controlling and managing drug stocks developed and processed?**

The aim is to use the ABC Curve, a stock management tool, to list the different drugs in the hospital pharmacy in question, identifying the priority ones, which should be given more attention. ABC Curve separates the different products into three classes, according to the representativeness of each item, which is calculated by multiplying the annual consumption of each item by its cost, making a listing in decreasing order and calculating the relative percentage of each item in relation to the total cost of the inventory (100%) [2].

The curve ABC or 80–20, is based on the principle of Pareto in which it is a statistical classification of materials, which considers the importance of materials, based on the quantities used and their value. Also according to the author, in an organization, this tool is widely used for stock management, and is also used to define sales policies, to determine priorities, to schedule production, etc [8].

Classically an ABC analysis consists of separating the stock items into three groups according to the annual demand value [3].The differential of the use of the ABC curve in inventory control is given by the classification of the items in classes A, B or C, in view of their costs and quantities. Therefore, the most important items are in small numbers and of high value, they should be controlled with greater caution [9].

An ABC classification of typical inventory items presents a configuration in which 20% of the items are considered A and that they account for 65% of the annual demand or consumption value. Items B represent 30% of the total number of items and 25% of the annual demand or consumption value. The remaining 50% of the items and 10% of the annual consumption value are considered as class C. Although it is known that these percentage values may vary from company to company, it is important to note that the ABC principle in which a small percentage of items is responsible for a large percentage of the annual demand or consumption value, it usually occurs [10].

To prove the importance of inventory management from the application of the ABC tool, a case study was carried out at a High Complexity Hospital in the city of Teresina-PI, whose main activity is oncological patient treatment, being a national reference center in its segment. The case study method involves an in-depth examination of an individual, a group, or an organization by a researcher or a team of researchers [1].

With regard to the data collection technique for the construction of the ABC curve for the control of drug stocks, a documentary survey was carried out with the warehouse and the purchasing sector, where information was collected about the cost and consumption of each item which makes up your inventory. The documents are used as sources of information, indications and clarifications that bring their contents to elucidate certain questions and serve as evidence for others, according to the researcher's interest [4].

The adoption of ABC classification methodology comprises three phases: elaboration of the master table; construction of the chart; and interpretation of the graph [6]. Initially a table containing the demand and inventory values of each item was constructed, based on documents and purchase statements of the 18 months analyzed by the survey. The quantity of products sold in the period was related to their unit prices and then the revenue of each item (price x quantity sold) was obtained.

The hospital has an immense catalog of products, from foods that are supplied to patients, clinical equipment, administrative materials, to very expensive oncological drugs. Between January 1, 2015 and June 30, 2016, purchases of 6194 different items were made. 151 of these items are medicines intended for the treatment of patients with some oncological pathology, the hospital's flagship.

With the data provided by the company, about the monthly sales of the products, the products were classified taking into account the individual quantity sold and the unit price. Tables 2 and 3 give an overview of the relationships between classes A, B and C and their respective percentages of sales and monthly revenue.

Table 1. – Curve ABC from Revenues

Classification	% of Revenues	% of Items
A	80,49%	25,83%
B	14,96%	24,50%
C	4,55%	49,67%

Table 2. – Curve ABC from Sales

Classification	% of Sales	% of Items
A	80,81%	11,92%
B	14,37%	20,53%
C	4,82%	67,55%

The ABC classification of the revenues allowed to define 39 items as class A, 37 items as class B and 75 items as class C. The ABC classification by quantity of sale allowed to define 18 items as class A, 31 items as class B and 102 items as belonging to class C.

The items Gosserrelin 10.8 mg, which despite having an average monthly demand of only 90 units, generated a revenue of R$ 83,467.29 and the Trastuzumabe 440mg that has a demand of only 3 monthly units but generates a revenue of R$ 30,454.73. In the opposite direction, for example, is the Diethylstilbenol 1mg that has a demand of 1167 units monthly, but only generates R$ 551.13 of revenue for the hospital.

If the curve is a function of sales, the above items, Gosserelin, Trastuzumab and Diethylstrobinol, which belong to classes A, A and C, respectively, in the revenue curve, are all in class C, considering monthly average demand.

In this way, we can see how not always the product that sells the most is the one that generates the most revenue, or the one that generates the most revenue is the one that has the greatest demand. Simpler or easier to get items, such as Dipirone Sodium, which patients can buy at any pharmacy without a prescription, have a low contribution margin, and although they sell a lot, they are weak in relation to the revenues. On the other hand, medications such as Trastuzumab 440mg that are used in oncology patient treatments and are only marketed in hospitals of high complexity, have a contribution margin of up to R$ 9,000.00.

Due to this variation that occurs between the curves, it is necessary to decide which are the criteria to be analyzed to adopt the curve: we intend to manage the inventory based on the turnover of the inventory, that is, based on the quantity of sales of each item, or do you intend to manage based on the amount that the item adds to the hospital's income, that is, based on your monthly contribution margin?

If it is decided to adopt the curve based on the turnover of the stock, one should study the physical arrangement of the stock/warehouse and place in more accessible areas the products that are usually sold, so that the loading and unloading time and delivery of the reduced. In the other case, if the decision is made to adopt the curve based on the revenues generated by each item, the authors suggest that tools be used to ensure that there is no shortage of the product in the inventory, such as resupply point calculation, economic lot, resupply quantity and security stock.

However, the authors of this paper argue that there is a possibility of adopting the two ABC curves and integrating them so that together they can serve as a hospital stock management tool, each one with its purpose, described above.

Finally, it is emphasized that the ABC curve can be used as a tool to support decision making, depending on its purpose. For example, in the molds of the curves constructed here, with the same items, it would be possible to construct ABC curves using as criteria the maintenance cost of the inventory, if it were desired to reduce security inventory costs, the fixed cost of the purchase, if the objective was to find out which drugs should be purchased in greater quantity, in order to minimize those costs, the shelf-life and stability of the medicine if the intention was to reduce the loss of medicines.

In this way, it was proposed to implement the ABC classification in hospital inventory management, in order to reduce unnecessary inventory costs, increase loading and unloading productivity, and avoid the lack of items that generated more profit for the institution.

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MATHEMATIC MODEL OF COURSE STABILITY WIDE-COVERAGE SOWING AND CULTIVATOR MACHINE-TRACTOR AGGREGATE

Abstract: in article are brought elaboration mathematic model of course stability wide-coverage machine-tractor aggregate and analytic solution of it. It is described the influenced forces of it when machine-tractor aggregate is moved.

Keywords: course stability, wide-coverage sowing and cultivator aggregate, machine-tractor aggregate, cultivator tractor, row spacing, front and rear wheels, mathematic model, resistance force.

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МАТЕМАТИЧЕСКАЯ МОДЕЛЬ КУРСОВОЙ УСТОЙЧИВОСТИ ШИРОКОЗАХВАТНОГО ПОСЕВНОГО И ПРОПАШНОГО-ТРАКТОРНОГО АГРЕГАТА

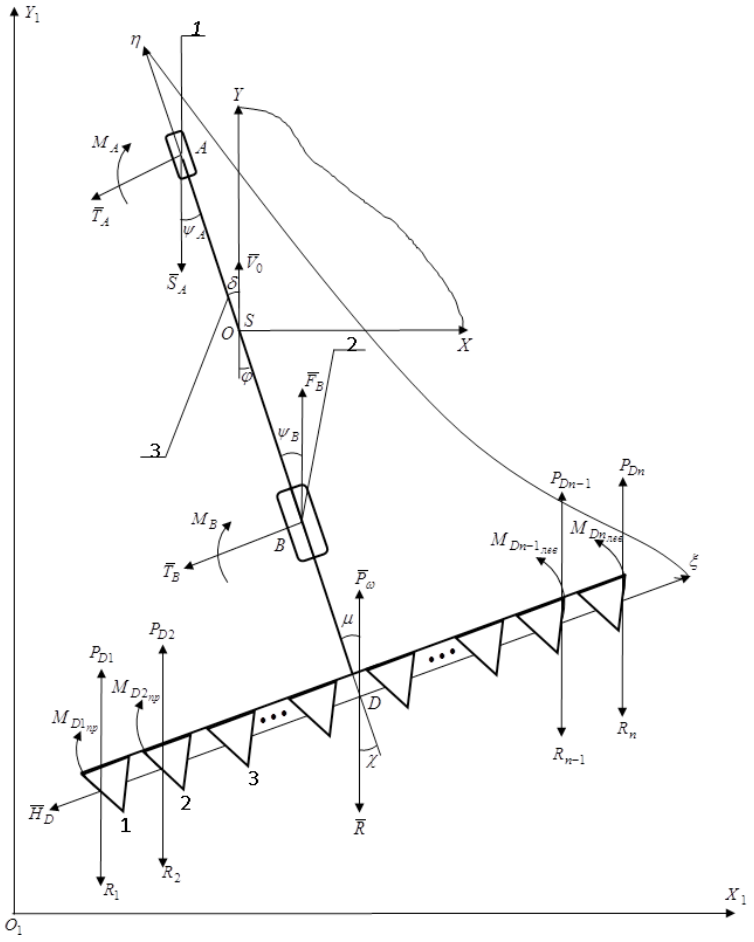
Аннотация: в статье приведены разработка математическая модель курсовой устойчивости широкозахватного машинно-тракторного агрегата и её аналитическое решение. Опысано параметры широкозахватного машинно-тракторного агрегата.

Ключевые слова: курсовая устойчивость, широкозахватной посевной и пропашной агрегат, машинно-тракторный агрегат, пропашной трактор, междурядья, передние и задние колеса, математическая модель, сила сопротивления.

It is increased efficient in bring up growing the crop that applying the wide-coverage machine-tractor aggregate for the purpose decreasing the working productivity and time spending. Therefore, it is required to research dynamic movement of wide-coverage machine-tractor aggregate. Across and corner vibrations are influenced noticeable to the movement of sowing and row space cultivator aggregate where at horizontal plain. The main reasons to create of vibration aggregates are accidental awakens created from working-body in row space where cultivating, unevenness of cultivating depth are caused to it and diverse of mechanic characteristic in row space. The presence of vibrations on horizontal plain of plunging aggregate is deteriorated quality of realized technologic process, haul way is increased and productivity is decreased. Traction resistance are increased from changing rough terrain than being cultivated row space layer and increased the comparative fuel expense and the work of machine-operator thickness is increased [1]. These vibrations the movement stability level. It will deteriorate of movement stability what the tendency is directing at increase of work productivity that owing to increase the seizure of width and working speed of machine-tractor aggregate were existing in now.

It follows that, it is required to investigate conditions of way stability at movement of wide-coverage machine-tractor aggregate.

For making up the differential equation of aggregate movement are based on calculated scheme at Picture-1. It is taken some following limits [2]: a) the aggregate movement is occurred evenly and advanced; b) it is taken the identical equivalent wheel with inflexibility coefficient of changeable wheel, that wheels are fixed on a bridge of tractor; the traction resistance of working-body are depicted form of the sum vector of driving force that brought to center; d) it is taken the small corners of sinus and the tangent are equal to themselves that are expressed in radian but cosinus is equal to one.



Picture-1. Calculated scheme for making up the differencial equation of cultivator aggregate movement [2]: 1, 2 – "equivalent" wheel of the tractor; 3 – symmetric plain of aggregate

We will see the regular and straight-line V_o movement condition as compared with not moveable of *X, O, Y* plains the center of gravity *S* of aggregate. With the center of gravity of aggregate. We will connect the beginning in rectilinear, advanced moving system of *XOY* coordinates. In according with main rectilinear, advanced movement of aggregate will connect the center of gravity of aggregate to the system with rectilinear, advanced moving of aggregate. The $\xi D\eta$ plain is rigidly connected with a longitudinal axis of the aggregate. It is described as from main rectilinear movement that is turning the $\xi D\eta$ plain than XOY plain.

It is accepted the following notes for making a differential equation: T_A, T_B – across forces of "equivalent" wheels of tractor, kN; M_A, M_B – moments of "equivalent" wheels of tractor when appearing a friction, kN·m; $M_{D1,rt}$, $M_{D2,lt}$ …, $M_{Dn-1,lt}$, $M_{Dn,lt} = M_{Dn,i}$ – main moments of couple forces where the point is putted, kN·m; S_A – rolling resistance force of "equivalent" wheels, kN; F_B – driving force of "equivalent" leading wheels of tractor, kN; $\overline{R}$ – main vector of the working-body resistance forces, kN; φ – simple slope corner of the aggregate symmetric plain than the axis Y, rad; χ – the slope corner from the aggregate symmetric plain of the main vector which is force resistance; δ – the corner between which is putting center of the speed vector and the aggregate symmetric plain, rad; ψ_A, ψ_B – corner deformation in friction of tractor tire; *D* – the force resistance putting center of working-body and driving forces.

Differencial equation of aggregate absolute movement:

$$\begin{cases} m\ddot{x}_S = \sum F_{1x}; \\ m\ddot{y}_S = \sum F_{1y}; \\ J_S\ddot{\phi} = \sum M_S(\overline{F}_1). \end{cases} \quad (3.1)$$

Differencial equation of cultivator aggregates are taken following form, if, it takes into consideration of the corners φ, ψ_A, ψ_B and χ:

$$\begin{cases} m\ddot{x}_s = -T_A - T_B + S_A(\phi - \psi_A) - F_B(\phi - \psi_B) - \\ -(P_{d1} + \cdots + P_{dn})\phi + (R_1 + R_2 + \cdots + R_n)(\phi - \chi) \\ m\ddot{y}_s = F_B - S_A - (R_1 + R_2 + \cdots R_n) \\ J_s\ddot{\phi} = aT_A - bT_B - M_A - M_B + (M_{d1,lf} + M_{d2,lf} + \cdots \\ \cdots + M_{dn,lf} - M_{d1,rt} - M_{d2,rt} - \cdots - M_{dn,rt}) + \\ + aS_A\psi_A + bF_B\psi_B + d(P_{d1} + P_{d2} + \cdots + P_{dn}) - \\ -d(R_1 + R_2 + \cdots + R_n)\chi \end{cases} \quad (3.2)$$

here $a = SA$ и $b = SB$ – the distance from the center of gravity S to the "equivalent" front *A* and rear *B* wheels, *m*;

$d = SD$ – the distance from the center of gravity S to the center *D* is putted that force resistance, *m*.

In according to the slipping theory of the tire, the across force (T_A, T_B), stabilizing moments (M_A, M_B) and the deformation of the corner of tire (ψ_A, ψ_B) are determined the following formulas

$$T = c\Delta; \quad M = f\psi; \quad \psi = k\Delta.$$

here *c* – the coefficient of across rigidity of tractor tire, kN/m; *f* – the coefficient of corner rigidity of tractor tire, kN·m/rad; *k* – the coefficient proportionality between deformations, 1/m; Δ – across deformation of tire, m;

Declination to the corner χ from aggregates' symmetry plain of main vector of force resistance is determined following expression

$$\chi = \alpha_0\delta;,$$

here α_0 – characterized coefficient of force parameters (R, P_ω) of working-body.

Now, we will determine analytic solution of elaborated mathematic model of course stability wide-coverage sowing and cultivator machine-tractor aggregate by expression (3.2). Rewrite the equation (3.2), it will have the following form:

$$\begin{cases} m\ddot{x}_s = F_1; \\ m\ddot{y}_s = F_2; \\ J_s\ddot{\phi} = M; \end{cases} \quad (3.3)$$

here

$$F_1 = -T_A - T_B - H_D + S_A(\phi - \psi_A) - F_B(\phi - \psi_B) - \\ -(P_{d1} + \cdots + P_{dn})(\phi - \mu) + (R_1 + R_2 + \cdots + R_n)(\phi - \chi);$$

$$F_2 = F_B + (P_{d1} + P_{d2} + \cdots + P_{dn}) - S_A - (R_1 + R_2 + \cdots R_n);$$

$$M = aT_A - bT_B - dH_d - M_A - M_B + (M_{d1,lf} + M_{d2,lf} + \cdots \\ \cdots + M_{dn,lf} - M_{d1,rt} - M_{d2,rt} - \cdots - M_{dn,rt}) + aS_A\psi_A + \\ + bF_B\psi_B + d(P_{d1} + P_{d2} + \cdots + P_{dn})\mu - d(R_1 + R_2 + \cdots + R_n)\chi$$

From system of equations (3.3) it will determine the sought for dynamic functions $\ddot{x}_s$, $\ddot{y}_s$ и $\ddot{\phi}$:

$$\begin{cases} \ddot{x}_s = \dfrac{1}{m}F_1 \\ \ddot{y}_s = \dfrac{1}{m}F_2 \\ \ddot{\phi} = \dfrac{1}{J_S}M \end{cases} \quad (3.4)$$

Leading vector function $\ddot{Y} = \left[\ddot{x}_s, \ddot{y}_s, \ddot{\phi}\right]^T$, rewrite the system equations (3.4) the form of vector:

$$\ddot{Y} = \begin{bmatrix} \ddot{x}_s \\ \ddot{y}_s \\ \ddot{\phi} \end{bmatrix} = \begin{bmatrix} \frac{1}{m} F_1 \\ \frac{1}{m} F_2 \\ \frac{1}{J} M \end{bmatrix} = F \text{ или } \ddot{Y} = F \qquad (3.5)$$

The discrete analogy is formed on the base of elaborated mathematic model of course stability wide-coverage sowing and row space cultivator machine-tractor aggregate. To solve investigating dynamic problem are worked out the calculation algorithm [3], instruction to use for from software and numerical algorithm of implementing calculation scheme.

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TO SELECT OPTIMAL TIRE SETS FOR CULTIVATOR TRACTORS

Abstract: in article are brought to select optimal tire sets with some models for cultivator tractor TTZ 1030 and of its other modifications. It is substantiated in accordance with constructive and kinematic compliance of wheels' front and rear bridge of tractor.

Keywords: tire sets, cultivator tractor, row space, front wheel, rear wheel, loading, leading tire, directing tire.

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ВЫБОР ОПТИМАЛЬНАЯ КОМПЛЕКТА ШИН ДЛЯ ПРОПАШНОГО ТРАКТОРА

Аннотация: в статье приведены выбора оптимального комплекта шин некоторых моделей для пропашного хлопководческого трактора ТТЗ 1030 и её других модификацию. Обоснованы по конструктивному размеру и кинематическому соответствиям колес трактора передних и задних мостов.

Ключевые слова: комплекты шин, пропашной трактор, междурядья, передние колеса, задние колеса, нагрузка, ведущие шина, направляющие шина.

It's known that, use of four wheel tractors where row space of cotton during cultivation mustn't be allow loading exceed or decrease on the bridge, it should be supplied ecological requirements agrotechnic indexes and compaction impact on soil, to be kept stability of tractors.

Furthermore, using for four-wheel tractors using on cultivation in row space of cotton plant will have increased of wheel tracks square and turning ground at the end of the field while bending. Inconsequence, it is observed decreasing of soils exceed compaction, to be crush of graft one part and decreasing fertileness. The above-mentioned deficiency might be settle to select through optimal turning method and minimal turning radius and optimal tire sets of four-wheel tractors.

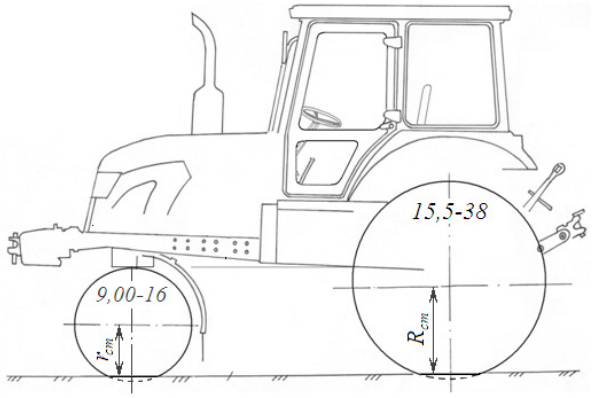
To select for the tire sets with another dimension, this must be kept indicated state on the along-vertical plain recommended from industrial producers. For example, it is expedient accepting by condition below using of GOST (ГОСТ) 7463–2003, GOST (ГОСТ) 30238.1–96 and Good Year tire catalogs to select tire sets of front and rear wheels of the tractor TTZ 1030 [1; 2].

$$R_{CT} - r_{CT} = \Delta const, \qquad (1)$$

here R_{CT} – static radius of rear wheels, m;

r_{CT} – static radius of front wheels, m;

$\Delta const$ – difference between static radiuses of rear and front wheels mounted tire sets of recommended from producers of tractor.



Picture 1. Kinematic dependence of front and rear wheels of TTZ1030 tractor by selecting tire sets

It is recommended mounting of tires to the front wheels 9.00–16 and to the rear wheels 13.6–38 or 13.6R38 to this tractor from industrial plant. If, it will be taking into account of static radiuses of these tires respectively, we will have following results by formula (1):

a) if, the tire is mounted for rear wheels 13.6–38 and for front wheels 9.00–16

$\Delta cons_1 = 740–403 = 337$ mm;

b) if, the tire is mounted for rear wheels 13.6R38 and for front wheels 9.00–16

$\Delta cons_2 = 717–403 = 314$ mm;

If, it is having a possibility to mount two types of tire, it is determined average values of formed by (1) formula, that is: $\Delta_{av} = (\Delta cons_1 + \Delta cons_2)/2.$ (1)

We will form following value using by formula (2)

$$\Delta_{av} = (337 + 314)/2 = 325 \text{ mm.}$$

The tires are selected to leading and directing wheels of the cultivator tractor TTZ 1030 according to this value (index value). We will separate determined value of constant *Δconst* from static radius of leading wheel tires. Inconsequence, the selected suitable tires of directing wheel of this tractor with near formed static loaded radius, contrarily for the leading tire of the wheel, which we will add the value statistic loaded radius of the leading wheel to constant value of *Δconst*. That is, the tire is influenced less to tractors' length permanent. Selected tires to the tractor TTZ 1030 are brought in table 1 in this way [3].

Table 1. – Selected tire sets to the tractor TTZ 1030

№	Leading tire	$R_{ст.}$, mm	Δ_{av}, mm	Directing tire	$r_{ст}$, mm
1	16.9R38 Ф-52	770	325	11.00–16 SL; 11.2R20	445 450
2	18.4R38 Ф-111	800		11.2*R*20	450
3	16.9R38 (*Good Year*)	752		13.0/75*R*16; 10.00–16 *SL*	400 415
4	18.4R34 (*Good Year*)	726		13.0/75*R*16	400
5	18.4R38 (*Good Year*)	777		11.2–20; 11.2R20	460 450

To selection tire sets is taken the base of tractors basis wheel tires. It has to count *Δconst* separate for other types of tractor.

Follows that, other types of tire sets might be select according to formulas by (1) and (2) to all the types of TTZ tractors'. Because of this, it should be take into consideration of tractors design and other dimensions.

Used to above (1) and (2) formulas, it might be select fitted tires sets to the wheels of the tractor TTZ 1030, which to take account of this length stability, manoeuvrability.

The results of carried out researches, selected all the directing front tires of the wheel to the cultivator tractor TTZ 1030 are satisfied the agrotechnic requirements. But, it is exceeded norm of the permitted ecologic requirement on soil. For this reason, it is demanded to select tires with larger overall dimensions and profile length that from front wheels (9.00–16; 12–16) dimensions.

It is not recommended using for row distance of these tires where to the leading wheels the profile length less than 15.5-inch that is mounted to the tractor the types of tires 13.6–38; 15.5–38, loading to tires is exceeded respectively 46 and 15 percent, and ecologic requirement the tire 13.6–38 is increased to 1.15 times. It will have decreased the output and increased the bending times when using these tires with coupled that in consequences of less agrotechnic clearance of machine-tractor aggregates and one particular plant growing field in of the Republic. That is why, it is not recommended using in row space with 15.5-inch profile length and the tires less than this values.

These tires are allowed to use in row space 90 cm mounted with profile length more than 15,5 inch to the tractor that they are satisfied the requirements with vertical loading, agrotechnic [4] and ecologic [5]. But, the tires profile length more than 18.4 inch value are applied in 90 cm row space that it will violates the agrotechnic requirements and damages the plant roots. They might be use until sowing operations while general soil tillage only.

Sudden damages and disabled tires using on tractor is brought to a stop doing agricultural works in farm. For instance, in this situation, when sowing is late for a day at spring season it will have negative influence to growing. Therefore, it is implied possibilities to fit other types of tires to the tractor also while for the purpose to prevent such these stops. That is why, to select other types of tires to the tractor is enabled using effectively from times.

Thus, based on results of carried out researches to take into consideration the 9,00–16 and 12–16 tires' pressure on soil are out of norm, they not to recommend to use in row space of cotton plants to the tractor TTZ 1030.

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RESEARCHING THE UNIFORMITY OF DISK HARROW RUNNING THROUGHOUT THE TILLAGE DEPTH

Abstract: The results of implemented researches in order to ensure the uniformity of disk harrow throughout the tillage depth with operating elements, installed on the framework at individual case at two rows are specified in this article.

Keywords: disk harrow, uniformity of tillage depth, force influence on a harrow, instantaneous center of rotation of a harrow, inclination corner of a line passing through appendix point of harrows traction resistance and instantaneous center of rotation to horizon.

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ИССЛЕДОВАНИЕ РАВНОМЕРНОСТИ ХОДА ДИСКОВОЙ БОРОНЫ ПО ГЛУБИНЕ ОБРАБОТКИ

Аннотация: В статье приведены результаты проведенных исследований по обеспечению равномерности хода по глубине обработки дисковой бороны с рабочими органами, установленными на раме в индивидуальном порядке в два ряда.

Ключевые слова: дисковая борона, равномерность глубины обработки, силы, действующие на борону, мгновенный центр вращения бороны, угол наклона линии, проходящей через точку приложения тягового сопротивления бороны и мгновенный центр ее вращения, к горизонту.

Uniformity of the disk harrow motion throughout the tillage depth is one of the main operation performances of all soil tillage machines. At the event if the required uniformity of the disk harrow motion is achieved, consequently uniformity of the soil tillage depth all over field the favorable conditions will be provided for equal grow and developing of the plants as well as its simultaneous maturing [1].

The results of implemented researches in order to ensure the uniformity of disk harrow throughout the tillage depth with operating elements, installed on the framework at individual case at two rows (fig. 1) are specified in this article.

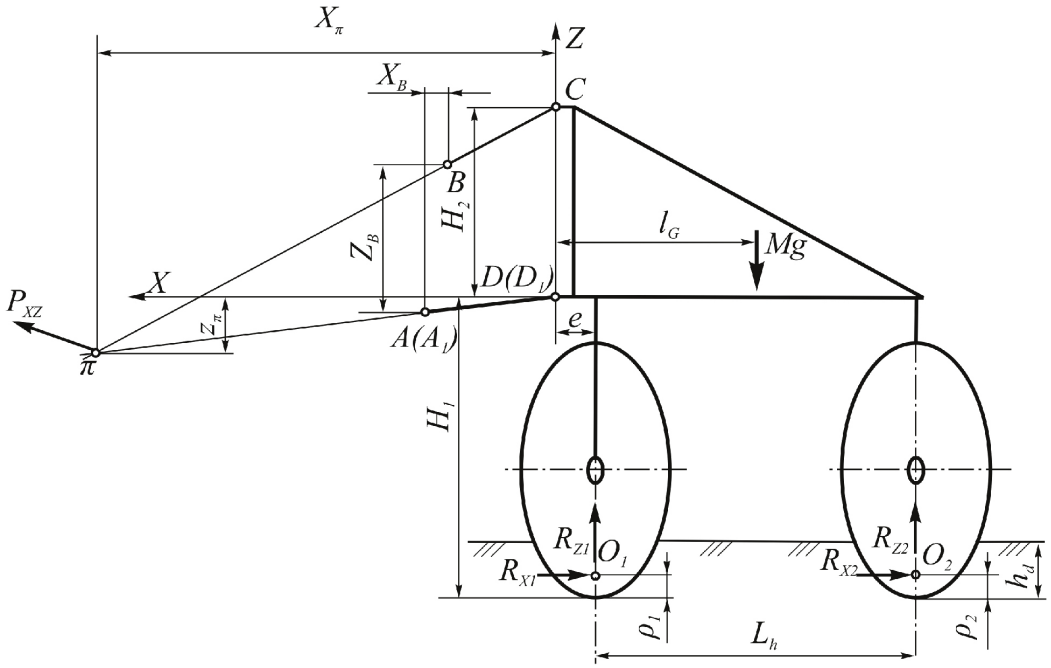

Figure 1. Scheme forces influencing onto the hitched disk harrow in the work process

According to fig.1 the uniformity term of tillage proceeding of harrow being considered will be specified as in the following:

$$Mg\left(l_G + X_\pi\right) - R_{Z1}\left(e + X_\pi\right) - R_{Z2}\left(e + L_h + X_\pi\right) - \\ - R_{X1}\left(H_1 - \rho_1 - Z_\pi\right) - R_{X2}\left(H_1 - \rho_2 - Z_\pi\right) = 0, \quad (1)$$

where M – harrow mass;

g – acceleration of the free fall;

l_G – longitudinal distance from the harrow draught center till its lower points of hitch;

X_π, Z_π – appropriately longitudinal and vertical distance from the lower points of harrow hitch until its instantaneous rotation center.

R_{Z1}, R_{Z2} – vertical type reaction of soil, attached to the operating elements appropriately of the first and the second row of harrow;

R_{X1}, R_{X2} – draught resistance of operating elements of the first and the second row of harrow;

L_h – longitudinal distance between operating elements of harrow;

e – longitudinal distance from the lower points of harrow hanger till the rotation center of the first row operating elements;

H_1 – vertical distance from plane of support till the lower points of harrow hitch

ρ_1, ρ_1 – distance throughout from the lower points operating elements of the first and the second row till the point where R_{X1} and R_{X2} forces are attached.

In this case if we accept formulas $R_{Z1} = R_{Z2} = R_Z$, $R_{X1} = R_{X2} = R_X$ as well as $l_G = e = 0.5L_h$ and $\rho_1 = \rho_2 = \rho = 0.5h_d$ (where h_d – tillage depth) (1, 2), let's consider formula (1) as in the following:

$$Mg - R_{Zt} - R_{Xt}\, tg\alpha_h = 0, \quad (2)$$

where $R_{Zt} = 2R_Z$ – general vertical reaction of soil to the harrow operating elements;

$R_{Xt} = 2R_X$ – general draught resistance of harrow;

$$tg\alpha_h = \frac{H_1 - 0{,}5h_d - Z_\pi}{e + 0{,}5L_h + X_\pi};$$

α_h – slope angle to line horizon passing through O point of R_{Xt} force attachment and instantaneous rotation center of π harrow (fig.2).

By using formula (2) let's determine a force, creating moment (relatively and instantaneous rotation center in effort to sinking the harrow into a soil

$$Q_h = R_{Zt} = Mg - R_{Xt}tg\alpha_h. \qquad (3)$$

Due to changeability physical-mechanical properties of soil the draught resistance of R_{Xt} harrow in the work process will change. It leads to violation of terms (1) and (2), as well as varying the Q_h force and after sunk depth of harrow operating elements into soil. At a result depth uniformity of the soil being tilled will not be provided. It should be noted that in the event if draught resistance of harrow increased it will result in decreasing Q_h force. It outwards in reducing the depth sinking into soil of operating elements of the harrow consequently the depth of soil tillage. By decreasing the draught resistance of harrow the Q_h force increases and depth of tillage enlarges.

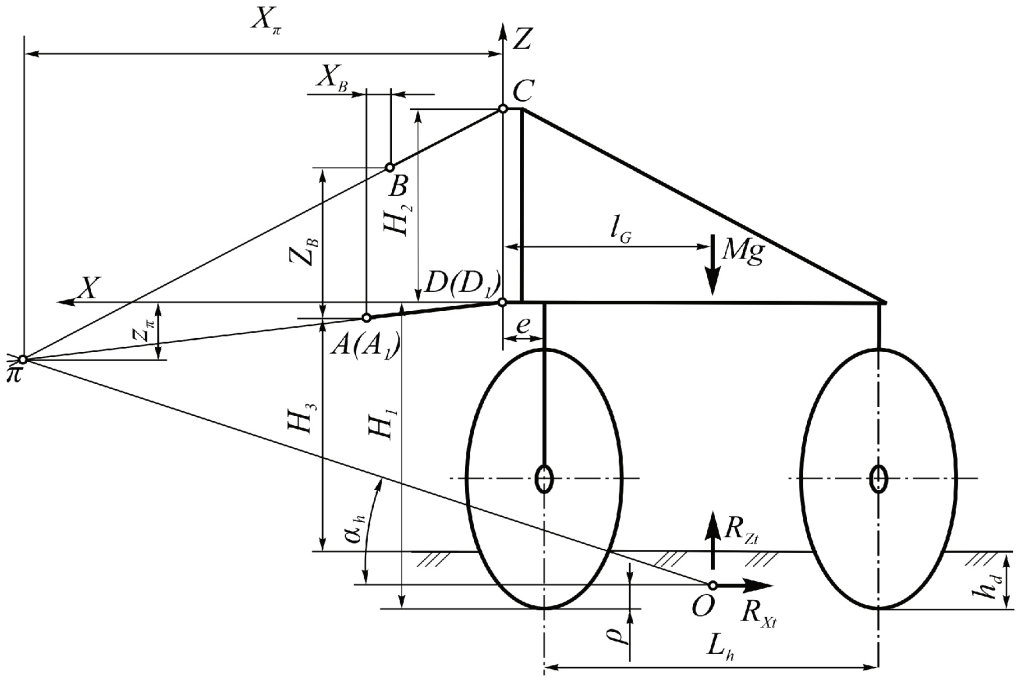

Figure 2. Scheme of α_h angle determination

In the event if the velocity of assembly motion is varied it also outwards to varying the R_{Xt} and tillage depth. In case if velocity increases R_{Xt} force raises, but when it is decreased – it reduces. Appropriately to it the tillage depth is varied, that means due to increasing the velocity it is decreased, by decreasing it enlarges.

As it should be followed from the formula (3) R_{Xt} force influence and due to the variability of physical-mechanical properties of soil, as well as velocity of assembly movement to uniformity of disk harrow motion throughout the tillage depth depends on α_h angle value. As this angle is less, as R_{Xt} force influence will be less and as well as physical-mechanical properties of soil and assembly motion velocity to uniformity of the harrow motion throughout the tillage depth. The best result is achieved in case if $\alpha_h = 0$, as this case R_{Xt} influences as it is specified on the formula (3) it is excluded onto the uniformity of harrow motion throughout the tillage depth.

So in effort to ensure uniformity of the harrow motion throughout the depth the slope line angle passing through the attachment point of its draught resistance and instantaneous center of rotation at longitudinal-vertical plane, must be possibly minimal or equal to zero.

By using the scheme on the (fig. 2) let's draw α_h angle by means of parameters and dimensions of harrow, its hitched installation and tractor hitch device.

$$\alpha_6 = arctg\left\{\left\{H_2\left(H_3+h_d-H_1\right)\left[\sqrt{l_h^2-0{,}25\left(l_n-c\right)^2-\left(H_3+h_d-H_1\right)}-X_B\right]+\left(H_1-0{,}5h_d\right)\times\right.\right.$$
$$\left.\left.\times\left[\left(H_2-Z_B\right)\sqrt{l_h^2-0{,}25\left(l_n-c\right)^2-\left(H_3+h_d-H_1\right)^2}-X_B\left(H_3+h_d-H_1\right)\right]\right\}:$$
$$:\left\{H_2\sqrt{l_h^2-0{,}25\left(l_n-c\right)^2-\left(H_3+h_d-H_1\right)^2}\left[\sqrt{l_h^2-0{,}25\left(l_n-c\right)^2-\left(H_3+h_d-H_1\right)^2}-X_B\right]+\right. \quad (4)$$
$$\left.+\left(e+0{,}5L_h\right)\left[\left(H_2-Z_B\right)\sqrt{l_h^2-0{,}25\left(l_n-c\right)^2-\left(H_3+h_d-H_1\right)^2}-X_B\left(H_3+h_d-H_1\right)\right]\right\},$$

where H_2 – vertical distance between the lower and upper points of harrow hitch;

H_3 – distance throughout the vertical from bearing plane of the tractor till lower immovable hinges A (A_1) of its hitch device;

X_B, Z_B – appropriately longitudinal and vertical distance between the immovable hinges A (A_1) and B of lower and central draughts of tractor hitch device;

l_h – length of lower longitudinal draughts of tractor hitch device;

l_n – lateral distance between the lower points of disk hitch;

c – lateral distance between immovable hinges of the lower longitudinal draughts of tractor hitch device.

As far as, in the formula (4), the values H_3, X_B, Z_B, l_h, e, c and L_h are known and set to the tractor and harrow, and the tillage depth must meet the agrotechnical requirements, and the required uniformity of disc harrow run throughout depth, and consequently the uniformity of tillage depth is achieved mainly due to the correctly chosen distances H_1 and H_2. The distance from the bearing surface of disc harrow to its lower points of hitch element and between the lower and upper points of its hitch element.

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CALCULATION PROGRAM FOR THE ACTIVE ELEMENTS OPTIMAL LOCATION OF THE URBAN BROADBAND ACCESS NETWORKS OF THE UZBEKISTAN REPUBLIC

Abstract: Active network elements have different productivity and price deviation. Designed program allows automatically select optimal technology of broadband services providing and calculates optimal characteristics of active network elements based on optimal throughput/optimal price parameter.

Keywords: multiservice network, Soft switch, media gateways, access network, multiservice traffic, broadband access, DSLAM, access level switch.

Broadband services require upgrading the access network with the introduction of new optical technologies. There are special algorithms and techniques that allow optimizing and automating the designing process of the access network based on copper cables at the planning stage during network modernization. However, these techniques are completely inapplicable if optical technologies are used to the access network modernization. Optical access networks, except for the optical cable and associated linear devices, contain active network elements such as routers, access switches, DSLAMs, which have different performance and, accordingly, a large price range [1, 18–24].

The developed program allows automatically choose optimal technology for broadband access services providing based on a set of rules. At the stage of developing the software algorithm, several options for implementing the program were considered, depending on the ultimate goal:

– based on the number and characteristics of the existing access multiplexers (technical department data), calculate the maximum number of possible connected subscribers with different access speed profiles;

– based on information of subscribers number and selected speeds (marketing department data), calculate the number of typical access multiplexers;

– based on information of subscribers number and selected speeds (marketing department data), and also based on equipment characteristics used in the Uzbekistan Republic calculate optimal configuration of network equipment.

Three different profiles of access speed were developed and tested [2, 447–449], in real calculations these profiles are not used, since the choice of a set of services by subscribers is quite unpredictable. According the studying results, it was decided to create flexible access profiles, consisting of the following components: IP television, High-speed Internet, IP-telephony, IP video-telephony.

1. Program implementation

Conditionally, the software interface can be divided into 5 parts. The first three parts are designed to enter information about users of IP telephony services, IPTV and access to the Internet, are the elements of the form, through which it is possible to specify the mass shares of users for each service and each speed profile (see fig.1). Program can analyzed VPN users also, but the VPN access form is not a standard service, it is impossible to predict the anticipated access speeds in advance, the input of the required information was placed in a separate logical part of the program.

The information output field is the fifth part of the form, where the final calculation results are indicated. Calculations of the total speed are carried out according to the formula described below. According to the formula, it is necessary to calculate two values of the total access rate, and then choose the maximum value from them. Let's consider some parts of the program.

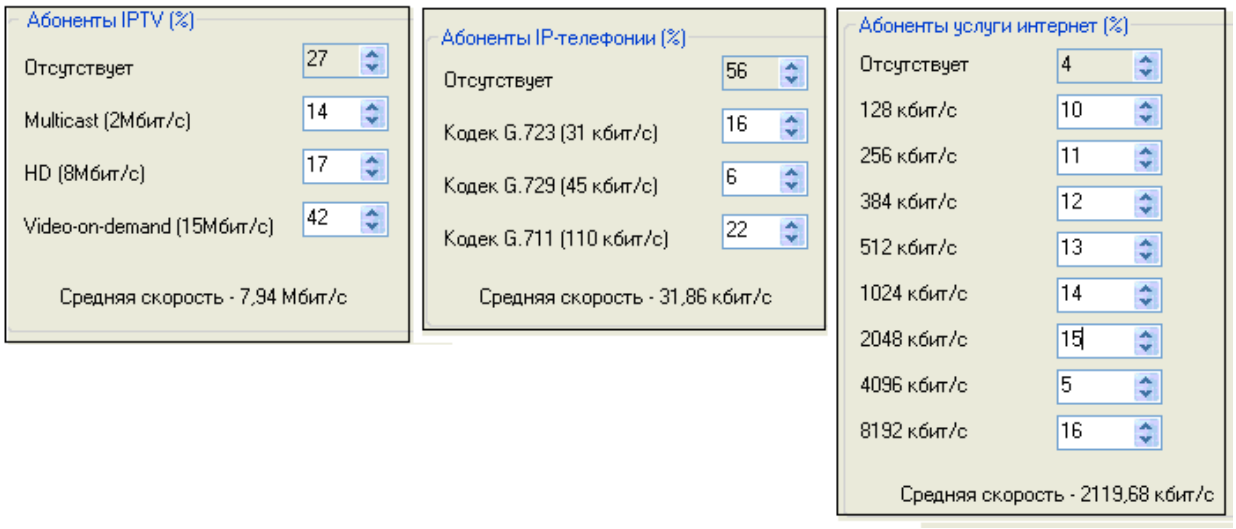

Figure 1. Forms for entering information about users of IP-telephony services, IP-television and access to the Internet

2. Entering data of the development type and settlement

You can enter data in two ways such as data input to a pre-formed map and input of data manually.

A pre-formed map is a graphic file that contains a schematic representation of the map of the settlement. On the map, different types of residential areas are marked with different colors. During the development of the software package, the following color codes were selected, listed in (Table 1).

Table 1. – Color codes for marking the types of sites

№	Site type	Color
1.	Non-residential area	White
2.	Private Sector	Gray
3.	Storey building	Green
4.	Administrative buildings	Blue

According to the RGB model each color is represented as a collection of three colors: red, blue and green. Each component of the desired color can take values from 0 (the component is missing) to 255 (the brightness of the component is maximum). Since in the process of drawing up a map there may be errors in the transmission of colors, it is necessary to introduce special rules for determining the color – how to compare the selected color with the reference one. To do this, a color detection function is introduced in the program.

If the selected color does not match any of the rules, the site is marked as non-residential. This allows you to reduce the error when using the software package.

Since, as a source data, a graphic file is used and the requirements are imposed only on the colors of the graphic file, the program can work with scanned versions of the available technological cards made on paper, which simplifies the data entry process. After selecting a graphic file with a map, program processes each pixel of the loaded image. Based on the received data, the pro-

gram generates an information matrix that contains a bit sequence of location data of different types of sites on the territory of the settlement.

Site data must be accurately linked to the terrain map, so in the first step of data entry, you need to specify a map graphic file, which can be obtained from open sources (for example, using the Google Earth program), or as a map, the official departmental information can be used.

After selecting the required file, the site of the settlement is conventionally divided into cells – regular hexagons (see fig.2). The size of the cell can be changed. The larger cell size simplifies data entry into the program, but increases the error. The smaller cell size increases the number of data entry operations, but it allows you to map the map accurately.

After selecting the required scale, the operator of the software complex sequentially selects each cell and marks the preferred type of sites on its territory.

If necessary, the operator can immediately enter detailed figures for the selected cell based on the available marketing data (number of subscribers, desired services) as shown in fig.3.After entering all the necessary information, the operator proceeds to the next step.

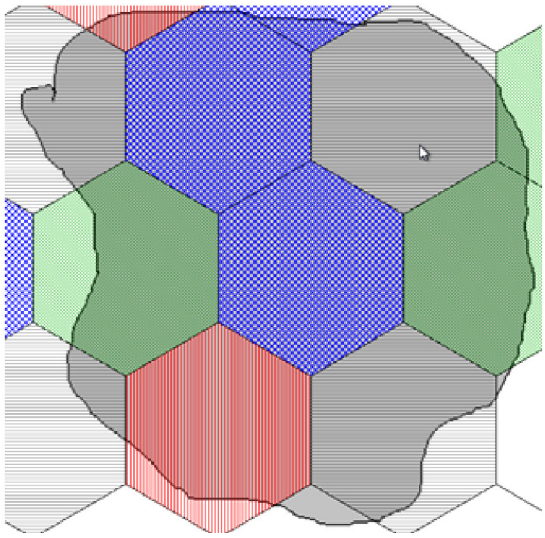

Figure 2. City map divided into hexagons of different site types

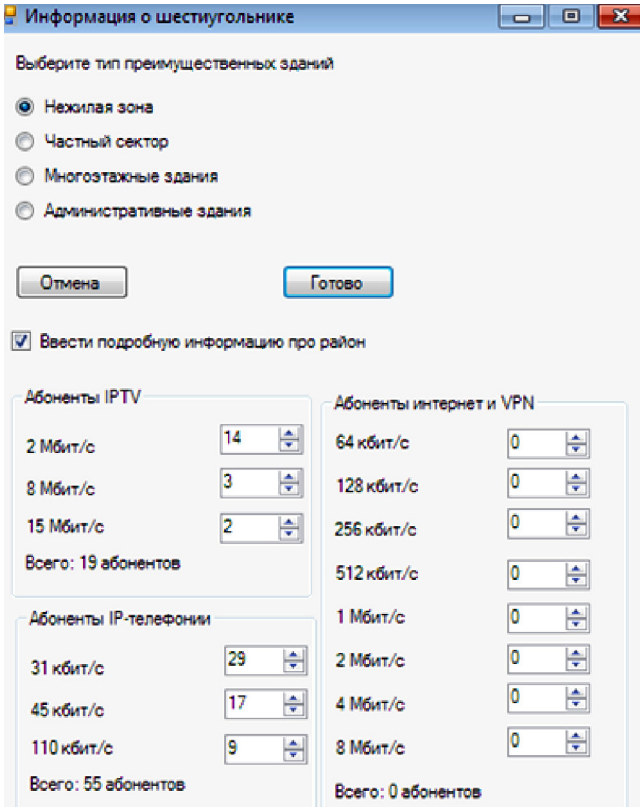

Figure 3. Entering detailed information about the hexagon area

3. Snap to the map of current nodes

Based on the data entry results the program has information about the subscriber location in the settlement area. The second stage requires the location of existing access points on the map.

Broadband access technologies-broadband are sensitive to distances, so you need to determine the scale of the map. The size of settlements on the territory of the Republic can differ several times, so it is impossible to apply a single scale on all maps. To determine the scale, the operator marks two points on the map, the distance between which he knows and sets this distance. The software complex produces the required calculations and determines the scale of the map (the number of pixels per kilometer).

After determining the scale, the operator marks the available access nodes (the existing automatic telephone exchange). The choice is made by "clicking" the left mouse button at the location of the access node. The program automatically tracks the location of access nodes

and does not allow placing two nodes at a distance of less than 5 pixels from each other. This function is necessary to avoid the situation when the operator mistakenly noted several access points at the same point.

4. Analysis of subscriber data

After entering all the information, the operator adds the information received from the marketing departments. As a result of entering this information, the software package starts to calculate.

It is assumed that all subscribers are connected with the same average speed in order to algorithm simplification. Such a simplification is permissible, since it gives an error of less than 1% when ca – the average data transfer rate from all sources, and – the sum of the standard deviation of all data rates from all sources, calculated by the formula [2, 447–449]

$$\sigma = R_1\sqrt{N\rho_1(1-\rho_1)} \qquad (2)$$

e_1 – the equiva μ lent width of the channel, is defined as

$$e_1 = \left\{\left[R_1\ln\frac{1}{\varepsilon} - K_d(\alpha+\beta)\right] + \left\{\left[R_1\ln\frac{1}{\varepsilon} - K_d(\alpha+\beta)\right]^2 + 4K_dR_1\beta\ln\frac{1}{\varepsilon}\right\}^{\frac{1}{2}}\right\}\left(2\ln\frac{1}{\varepsilon}\right)^{-1} \qquad (3)$$

Therefore, we have

$$e1 = \frac{\eta_1 - K_d + \sqrt{(\eta_1 - K_d)^2 + 4K_d\eta_1\rho_1}}{2\eta_1}R_1 =$$

$$= \frac{\frac{R_1}{\alpha+\beta}\ln\frac{1}{\varepsilon} - K_d + \sqrt{\left(\frac{R_1}{\alpha+\beta}\ln\frac{1}{\varepsilon} - K_d\right)^2 + 4K_d\times\frac{R_1}{\alpha+\beta}\ln\frac{1}{\varepsilon}\times\frac{\beta}{\alpha+\beta}}}{\frac{2R_1}{\alpha+\beta}\ln\frac{1}{\varepsilon}}R_1 \qquad (4)$$

Where: $R_1 = C_1$, where C_1 – is the connection speed between the source and the multiplexer, R_1 – the peak data rate from source, K_d – size of the access switch buffer.

An additional complication is the fact that, according to the formula, it is necessary to calculate two values of the total access rate [4, 26–31], and then choose the maximum value from them (see fig.4).

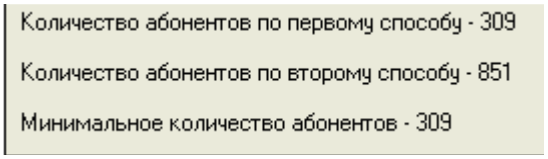

Figure 4. Window of the results of calculation of the total access rate

5. Choice of used access technologies

The software complex allows automatically select the optimal technology for providing broadband access services. When choosing broadband technologies for covering a settlement, the following algorithm is applied [5, 132–133]:

1. All administrative buildings are connected using FTTB technology.

2. All subscribers that are located around the access node at a distance not exceeding the range of FTTC technology, whose speed does not exceed 5Mbps are connected using FTTC technology.

3. Determine areas which are not covered by FTTC technology.

4. If the uncovered area consists of multi-storey buildings mainly, the total speed requested by subscribers situated of the section does not exceed 1Gbitps, it is recommended to connect this section using FTTB technology.

5. If the uncovered area consists mainly of storey buildings and the total speed requested by subscribers situated of the section exceeds 1Gbitps, it is recommended to create a new access node and provide services using FTTC technology.

6. If the uncovered area consists mainly of the private sector, the use of FTTH technology is recommended.

In addition to choosing the most optimal technology, the software complex allows you to simulate the coverage of a community by broadband services only by one technology (see Fig. 5) [6, 956–963].

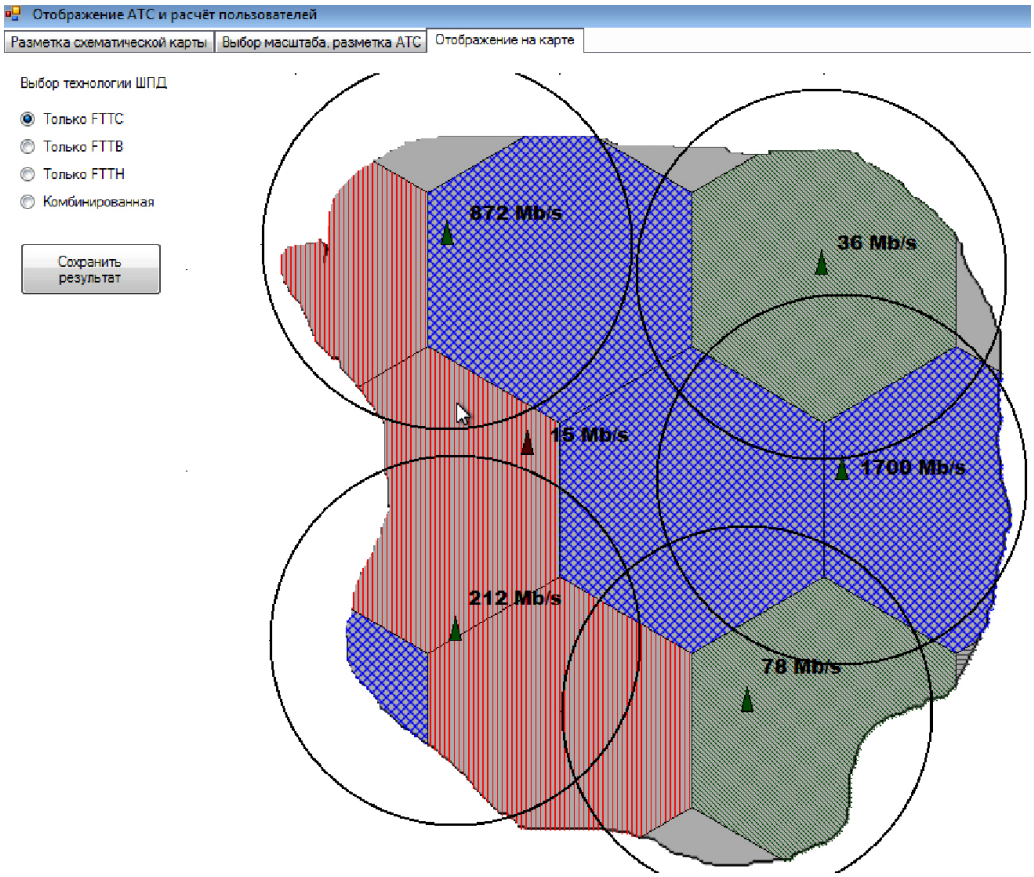

Figure 5. Display of calculation results

Conclusions

As output information, the program complex outputs the following data:

– location of new access nodes, if FTTC is used;

– the equipment characteristics, which is installed on each access node separately for each technology;

– the minimum capacity of fiber-optic communication lines required to provide all subscribers with broadband access. It is calculated as the total peak access speed for all broadband technologies at all access nodes.

The result can be saved as a text file, or as a graphic image.

Approbation of the program was carried out at several sites using technological cards of JSC "Uzbektelecom". To approve the program, a site was selected in the coverage area of the PSTN exchange, a pre-formed map was downloaded from the site http://GoogleEarth.com. On the map, different types of residential areas were marked with different colors.

After determining the scale, the operator made a binding to the map of the current nodes (existing PBX and MSAN). Then, the user entered data on existing subscribers and added information received from marketers. The program calculated the coverage of the automatic telephone exchange.

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DETERMINATION OF THE MAIN PARAMETERS OF THE DEVICE FOR SORTING SOLID HOUSEHOLD WASTE

Abstract: The issues of implementation of the main statements of the theory of impact to the definition of rational parameters of a sorting device are considered in the paper.

In addition, the design of a sorting device is proposed which will improve the efficiency of the process of household waste sorting.

Keywords: solid household waste, sorting, impact, metal strip, flight range, sorting device, impulse.

Existing technologies for collection, transportation and processing of solid household waste (SHW) in Uzbekistan do not provide for their sorting before stacking at landfills.

At the same time, sorting of solid waste (metal, plastic, glass, paper, etc.) before stacking makes it possible to save raw materials and territories for landfills, and also helps to improve the environment.

So in comparison with the smelting of steel from primary raw materials at the output of 1 ton of steel from iron scrap, air pollution is reduced by 86%, water by 76%, and the amount of solid waste by 97%. In comparison with the production of paper from primary raw materials, when it is extracted from recycled paper, air pollution is reduced by 73%, water by 25%, and the amount of solid waste by 39% [1, 17].

In this regard, research aimed at developing and justifying the rational parameters of a device for sorting solid waste is relevant and of great economic importance.

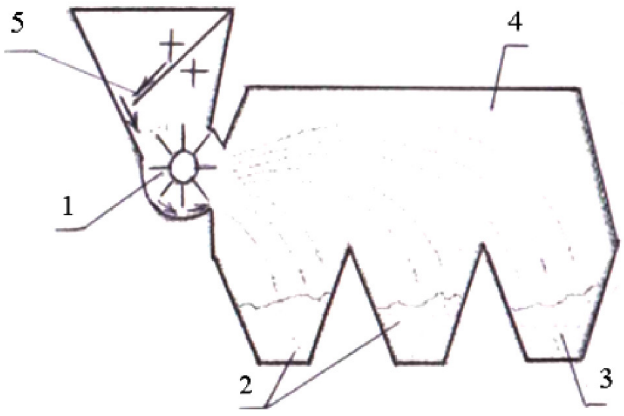

Figure 1. Scheme of the proposed sorting device. 1-rotor; 2 – organic parts; 3 – solid parts; 4 – bunker; 5 – metal strip

Based on the analysis of the SHW sorting process, the design of a sorting device has been developed (Fig. 1). The principle of the device is as follows. The waste is fed into the bunker via a feeder. Slipping along the surface of a metal strip, the waste falls into the zone of rotating rotor, and then the blades strike on the waste,

and toss it along a horizontal or slightly upward trajectory. Solid, dense and elastic particles get high speed and fly along a longer trajectory, while soft and inelastic particles fly off only a short distance.

To evenly feed the waste, the device is equipped with a metal strip 5.

The feed layer can be adjusted depending on the fractional composition.

In addition, the impulse *S*, applied to the rotor blade on the side of the constituents of the waste under the impact, causes impact forces of pressure on the bearings in which the axis of rotation of the rotor is fixed. Accordingly, there appear reactions of bearings equal to these forces, but oppositely directed, which in turn negatively affect the durability of the structure.

In order the reactive impact impulses vanish under the strike on the body rotating around a fixed axis, the point of application of the impact pulse *S* must be spaced from the axis of rotation *z* at a distance d, that is, the center of impact must be at a distance d from the axis of rotation

$$d = \frac{J_z}{m_B \cdot x_c} \qquad (1)$$

where J_z is a moment of inertia of the body relative to the axis passing through the axis of rotation, m_B is a mass of the body, x_c is a coordinate of the center of gravity of the body [2, 549].

In order to prevent negative effect of reactive pulses and to increase the impact efficiency from the rotor blade, the blade is designed in the form of a pendulum, the bulk of which is concentrated in the impact zone. The design of the rotor blade and shute along which the waste moves allow us to consider the process of collision of the rotor blade with the components of the waste as a flat impact.

Consider the collision of two bodies *A* and *B* (where *A* is a rotor blade, *B* is the waste components).

The rotor blade is represented as a plate. The rotor blades rotate uniformly around the fixed axis, and the components of the waste perform arbitrary plane motion before and after impact (Fig. 2). Introduce a fixed coordinate system *xy* by directing the *y* axis parallel to the impact line, and two translationally moving coordinate systems whose origin is in the centers of gravity of the bodies, and the axes are parallel to the *x* and *y* axes of the fixed coordinate system. The projections of absolute velocities of the centers of gravity are denoted by u_A, u_B (on the *x*-axis) and by υ_A, υ_B, (on the *y*-axis); angular velocities of the bodies by ω_A and ω_B.

Additional indices – and + mark the pre-impact and post-impact state.

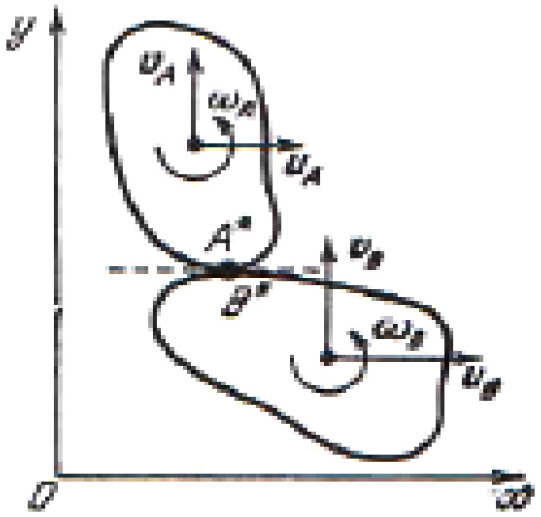

Figure 2. Design scheme of the process of rotor blade collision with the constituents of the waste

The moments of inertia of the bodies relative to the axes passing through the centers of gravity, as well as the masses of the bodies denote as J_A and J_B and m_A, m_B, respectively. The points of the impact contact are denoted by the letters A^* and B^*, and x_A^* y_A^*, x_B^* y_B^* – are the coordinates of these points in corresponding moving coordinate axes. The velocities of the points A^* and B^* in the projections on *x* and *y* axes are equal.

$$\left.\begin{aligned} u_A^* &= u_A - \omega_A y_A^* \quad & \upsilon_A^* &= \upsilon_A + \omega_A \cdot x_A^* \\ u_B^* &= u_B - \omega_B y_B^* \quad & \upsilon_B^* &= \upsilon_B + \omega_B \cdot x_B \end{aligned}\right\} \qquad (2)$$

Let S_x and S_y be the values of the components of the impact pulse parallel to *x* and *y* axes; then the equations of the quantities of motion and the moments of the quantities of motion for each of the bodies are written in the form

$$\left.\begin{aligned} m_A(\upsilon_{A+} - \upsilon_{A-}) &= S_y \\ m_B(\upsilon_{B+} - \upsilon_{B-}) &= -S_y \\ J_A(\omega_{A+} - \omega_{A-}) &= -S_x \cdot y_A + S_y \cdot x_A \\ m_A(u_{A+} - u_{A-}) &= S_x \\ m_B(u_{B+} - u_{B-}) &= -S_x \\ J_B(\omega_{B+} - \omega_{B-}) &= -S_x \cdot y_B - S_y \cdot x_B \end{aligned}\right\} \qquad (3)$$

Six equations (3) contain eight unknowns – the six projections of post-impact velocities and two quantities S_x and S_y.

To close the system of equations, Newton's hypothesis is used.

$$\upsilon^*_{A+} - \upsilon^*_{B+} = -R(\upsilon^*_{A-} - \upsilon^*_{B-}) \quad (4)$$

where R is a restoring coefficient and one of the hypotheses of tangential interaction, for example, the Routh hypothesis

$$|S_x| \le f \cdot S_y \quad (5)$$

f – is a dynamic coefficient of friction.

Equality sign is used when slip occurs in the tangential direction between the bodies.

From eight relations (3) – (5) one can find the normal impact impulse S_y (6)

$$S_y = \frac{(1+R)(\upsilon_{B-} + \omega_{B-} \cdot x_B - \upsilon_{A-} - \omega_A \cdot x_A)}{\frac{1}{m_A} + \frac{1}{m_B} + \frac{x_A}{J_A}(x_A - f \cdot y_A) + \frac{x_B}{J_B}(x_B - f \cdot y_B)},$$

through which all other unknowns are expressed [3, 123–124].

$$\left.\begin{aligned} S_x &= f \cdot S_y \\ u_{A+} &= u_{A-} + \frac{f \cdot S_y}{m_A} \\ u_{B+} &= u_{B-} - \frac{f \cdot S_y}{m_B} \\ \omega_{A+} &= \omega_{A-} + \frac{S_y}{J_A}(x_A - f \cdot y_A) \\ \upsilon_{A+} &= \upsilon_{A-} + \frac{S_y}{m_A} \\ \upsilon_{B+} &= \upsilon_{B-} + \frac{S_y}{m_B} \\ \omega_{B+} &= \omega_{B-} + \frac{S_y}{J_B}(f \cdot y_B + x_B) \end{aligned}\right\} \quad (7)$$

If the results of equality (7) are used for the process of collision of the rotor blade with the components of the waste, then the equations of the waste component containing impact values are of greatest practical interest, since in this motion the rotational part can be ignored. In addition, this body (constituents of solid household waste) can be considered as a material point.

$$\left.\begin{aligned} u_{A+} &= u_{A-} + \frac{f \cdot S_y}{m_A} \\ \upsilon_{A+} &= \upsilon_{A-} + \frac{S_y}{m_A} \end{aligned}\right\} \quad (8)$$

The values of pre-impact velocities u_{A-}, υ_{A-} are easily determined from the design and technological parameters of the sorting device.

It is known that the projections of the pre-impact velocities of the constituents of the waste are equal to

$$\left.\begin{aligned} u_{A-} &= \sqrt{\upsilon_0^2 + 2gh} \cdot \cos\alpha \\ \upsilon_{A-} &= \sqrt{\upsilon_0^2 + 2gh} \cdot \sin\alpha \end{aligned}\right\} \quad (9)$$

where υ_0 is the rate of falling of the constituents of the waste from the end of the conveyor;

h is the height of the falling of the waste;

α is the angle of inclination of the bunker shute relative to the horizon.

Introduce the notations

$$\frac{S_y}{m_A} = c, \quad \left.\begin{aligned} u_{A+} &= \sqrt{\upsilon_0^2 + 2gh} \cdot \cos\alpha + c \cdot f \\ \upsilon_{A+} &= \sqrt{\upsilon_0^2 + 2gh} \cdot \sin\alpha + c \end{aligned}\right\} \quad (10)$$

The absolute value of the post-impact velocity is

$$\begin{aligned} \upsilon_{абс} = \sqrt{u_{A+}^2 + \upsilon_{A+}^2} = \sqrt{(\upsilon_0^2 + 2gh)\ \cos^2\alpha + 2cf \cdot} \\ \cdot\sqrt{\upsilon_0^2 + 2gh}\cos\alpha + c^2 f^2 + (\upsilon_0^2 + 2gh)\ \sin^2\alpha + \\ + 2c\sqrt{\upsilon_0^2 + gh}\sin\alpha + c^2 = \sqrt{(\upsilon_0^2 + 2gh)\ + c^2(1+f^2) + } \\ + 2c\sqrt{\upsilon_0^2 + 2gh} \cdot (f\cos\alpha + \sin\alpha) \end{aligned} \quad (11)$$

taking into consideration that $1 + f^2 \approx 1$

$$\begin{aligned} \upsilon_{абс} = \sqrt{(\upsilon_0^2 + 2gh)\ + c^2 + 2c \cdot} \\ \cdot\sqrt{\upsilon_0^2 + 2gh} \cdot (f\cos\alpha + \sin\alpha) \end{aligned} \quad (12)$$

After the end of the impact process (12), elastic components of the waste will move as free undeformable bodies and the equation of their motion will present a parabola.

$$y = x\,tg\alpha - \frac{h}{2 \cdot \upsilon_{абс} \cdot \cos^2\alpha} \cdot x^2 \quad (13)$$

The maximum height of the trajectory of the constituents of the waste and the range of the flight can be determined by the following formulas:

$$H = +\frac{\upsilon_{абс}^2}{2g} \cdot \sin^2 \alpha \,,\; L = \frac{\upsilon_{абс}^2}{g} \cdot \sin^2 \alpha \qquad (14)$$

where H – is the maximum height of the trajectory of the constituents of waste; L – is a range of flight of the constituents of the waste.

Thus, from equations (12), (13) and (14), depending on the value of the restoring factor, mass, shape, moment of inertia, and the angle of rebound of the constituents of the waste, it is possible to determine the design and technological parameters of a sorting device.

The received constructive and mode parameters will allow to develop the physical model of a sorting device.

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RESEARCH OF THERMO MOISTEN MODE IN UNDERGROUND VEGETABLE STOREHOUSES IN THE CONDITIONS OF HOT — ARID CLIMATE

Abstract: In the article, features of creation optimum thermo Technical mode and results of researches of a temperature field of a soil mass in underground vegetable storehouses are stated.

Keywords: vegetable storehouse, thermo steam, specific thermal emissions, thermo physical measuring.

Transportation of vegetables on the distances measured in tens, and sometimes hundreds of kilometers and this leads to partial loss of a crop and demands the expense of fuel on transportation. Therefore the construction (designing) of small underground vegetable storehouses in places of cultivation of vegetables and on fields of farms, and their optimum power supply is an actual problem.

Long storage of products in underground storehouses in many respects depends from operational and thermo technical characteristics of protections and parameters of internal air and their coordination with parametres of soil. According to results of J. Fure's researches [1] it is known that special thermal properties of underground constructions – thermo started microclimate – arise because of existence of certain depth in the soil mass which temperature remains approximately a constant even, despite presence of final value of heat conductivity of a layer.

For research of heat moisten mode and measurement ground temperature in underground storehouse we developed thermo physical measuring stand which is presented on (fig. 1)

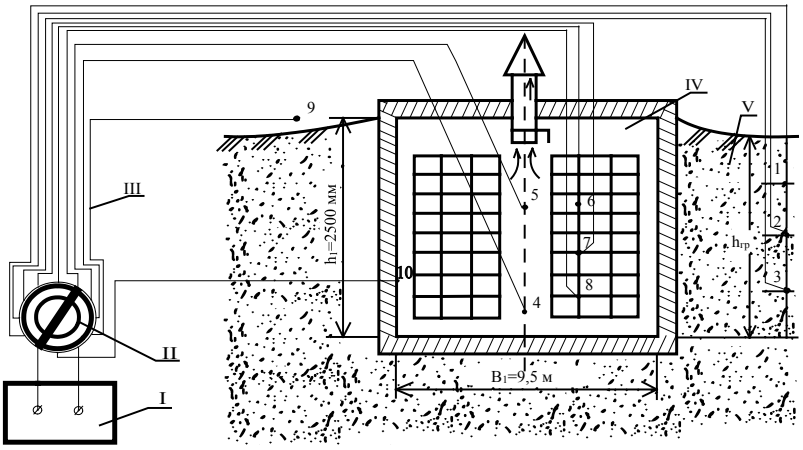

Figure 1. The Cross-section underground vegetable storehouse and point of measurement of temperature in ground (1, 2, 3), storehouse (4, 5), embankments of vegetables (6, 7, 8), external air (9) and an internal surface of protection (10). I – a potentiometer, II – the switch; III – thermo steam; IV – the refrigerating chamber; V – soil mass

Typical distribution of temperatures in thickness of a ground for hot environmental conditions of the Kashkadarya area is presented on (fig. 2). In depending on a season.

Comparison of results of measurements shows that the thermal mode of an underground soil is formed under the influence of two major factors – solar radiation falling on a surface and stream of radio gene heat of terrestrial bowels. Seasonal and daily changes of intensity of solar radiation and temperature of external air cause fluctuations of temperature of the top layers of earth. Depth of penetration of daily fluctuations of temperature of external air and intensity of falling solar radiation depending on the concrete soil-environmental conditions fluctuates within 15–20 sm to 1.5–2.0 metres. Depth of penetration of seasonal fluctuations of temperature of external air and intensity of solar radiation for conditions of the Kashkadarya area does not exceed than 15–20 m.

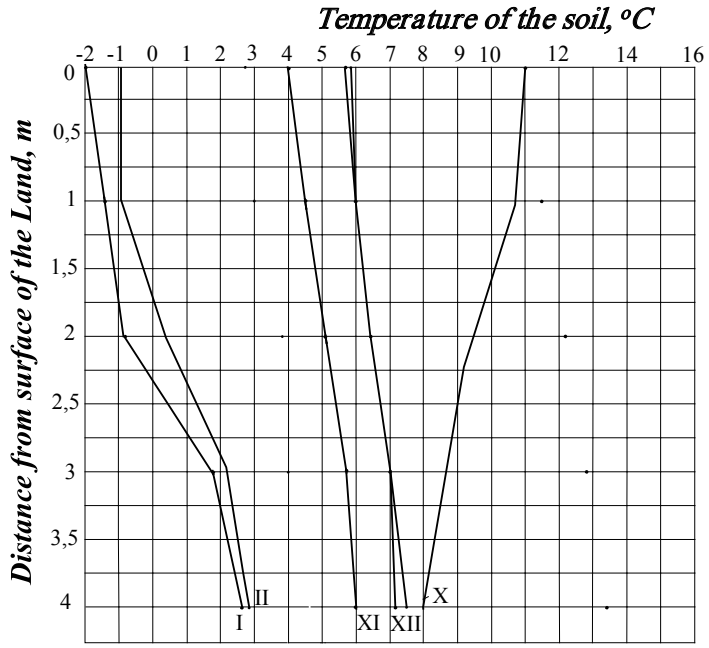

Figure 2. The schedule of changing the temperature of a ground depends on depth

Results of measurements shows that in depth h = 3 m in the conditions of Karshi in storage of vegetables (October – March) the average temperature of a ground always positive and stable, and fluctuates in limits t_{gr} = +2 ÷ +7 C. From the point of view of creation of underground storehouse, this depth is the most suitable as in the plan of thermo starting internal volume of air, and in the plan permanency of this mode. Building of vegetable store house in depth h = 3–4 m gives notably saving of energy for creation of an optimum microclimate.

The special place among underground constructions is occupied with the objects intended for storage of agricultural production. It is known [2; 3] that (in spite of the fact that storehouses concern the category of uninhabited objects) storage production represents object considerable heat – and humid separation.

Problem to complicate that fact that with increase in temperature of storage intensity of the biochemical processes proceeding in storing of production increases, and together with them intensity of specific thermal emissions increases. Generalisation of the given various sources [3; 4] shows that the increase in temperature of storage in an arithmetic progression leads to increase of density of thermal emissions in a geometrical progression (fig. 4). Thus, the specific density of thermal emissions q (Vt/kg) with sufficient degree of accuracy is approximated by expression:

$$q = q_0 \exp(bt), \quad (1)$$

where q_0, b – the constant, accepted on [2].

In usual refrigerating chambers for storage of vegetables the storage mode is characterised by three basic thermo technical n parametres: in temperature, relative humidity and frequency rate of air circulation (speed of air) indoors. Maintenance in chambers of optimum values of temperature, relative humidity and frequency rate of air circulation yields good results. However, in many

cases it is insufficient. It is necessary to provide also optimum (for vegetables of each kind and grade) structure of environment in the chamber, characterizing defined concentration O_2, CO_2 and N_2.

Gas exchange of products with environment is characterised by the equalization of breath [4]: $C_6H_{12}O_6 + 6O_2 = 6CO_2 + 6H_2O$ + 2824 кJoule warmth

It is apparently from the results above the balance equalization, breath of products is accompanied by allocation in environment of energy in the form of warmth. Values of these thermal emissions are approximately proportional to intensity of breath of fruits, vegetables and it is defined on the volume of emission of CO_2. As a result of breath of fruits and vegetables structure of environment in the refrigerating chamber Changes – the oxygen maintenance decreases, and carbonic gas increases. This feature of breath of fruits allows creating in the refrigerating chamber the modified gas environment with the lowered concentration of oxygen O_2 and raised carbonic gas CO_2.

Pauperisation (decrease in concentration O_2) internal air oxygen and enrichment by its carbonic gas brakes intensity of breath of fruits and vegetables, thereby decreases their losses and increases periods of storage. Thus concentration of oxygen should not be less than 3%, and CO_2 – more than 10%.

Results of calculations under the formula Gore (1) presented in the form of schedules on (fig. 3).

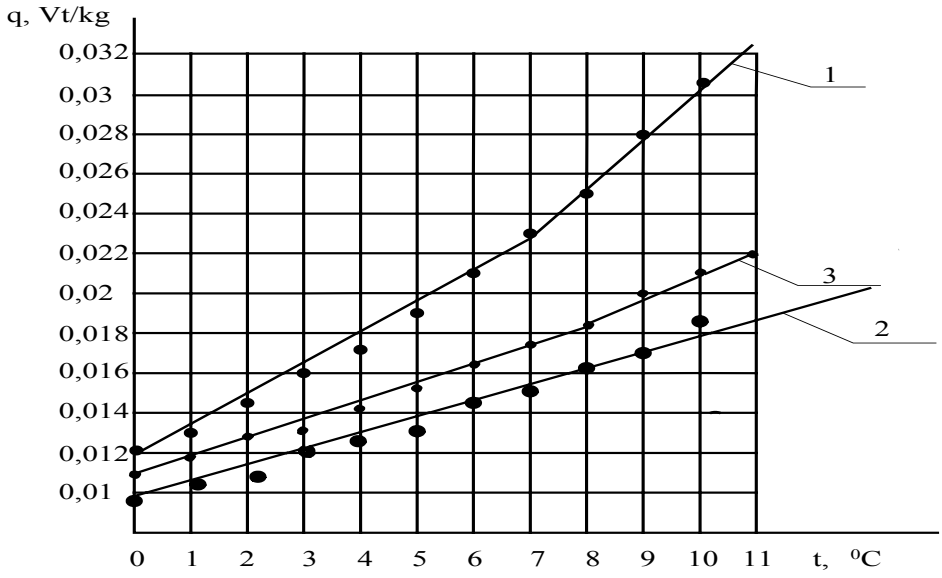

Figure 3. Intensity of thermal emissions of apples (1), potatoes (2), onions (3)

According to the results of researches it is possible to make the following conclusion that the most suitable criterion defining parametres of a microclimate in underground storehouse, it is necessary to consider seasonal distribution of temperatures in thickness of a ground and thermo physical properties of the ground. In this plan the most effective thing can be appeared that the underground storehouse intended for storage of fruits and vegetables.

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SPECIAL ASPECTS IN INTERPRETATION OF TERMS "KNOWLEDGE-INTENSIVE", "INNOVATIONS", "INNOVATIVE ACTIVITIES" BY CIS SCIENTIFIC COMMUNITY

Abstract: This article concludes that scientists' understanding of different scientific terms and concepts "knowledge-intensive", "innovations", "novelty", "innovative production" in some extent differs from their interpretation by laws and regulations as well as by executive bodies. The author offers, when determining developments and services as innovative ones, to rely on up-to-date trends of global economy: "Industry 4.0", "Theory of technological waves", etc.

Keywords: innovations, novelty, innovative production, technological wave.

Electronic materials from Elibrary include data from 26489523 published theses, reports, patents, articles from scientific journals, books, conference materials and deposited manuscripts [1].

When entering to Elibrary search system the queries "innovations", "innovations in education", "innovative technologies", the system generates three lists, which include: 160020, 8706 and 48151 literature sources, relatively. Thus, data selection was made in 69 scientific directions including data on 160 thousand of scientific materials published by the scientists from CIS countries in the editions of close abroad and far abroad countries.

In view of the aforesaid, we can make conclusions on the mainstream tendencies in development, implementation and offering innovative projects by the scientific community. As these work papers are created by the representatives from different countries, nations, cultures, we may indicate that the described facts have global nature.

Due to analysis of the obtained digits and data, we can suggest that the point of view of the scientific community from CIS countries concerning innovations and innovative activities differs in some extent from the main provisions and instructions of the governmental programs. The scientists tend to understand these concepts somewhat wider than the current laws and regulations (hereinafter "laws and regulations"), the corresponding authorities and governmental structures, for example, State Committee on Science and Technology (hereinafter SCST), the Council of Ministers, the Ministry of Education, etc.

Let us prove this conclusion with figures and some statistical data.

In response to the request "innovations", we found top ten occupations and activity spheres, which publish the most amount of materials:

– economic science (85579 units of published materials);

– organization and management (31084 publications);

– popular education and pedagogics (21042 publications);

– social science (16616 publications);

– legal sciences (15182 publications;

– agriculture and forestry (13892 publications);

– political science (8852 publications);

– psychology (6615 publications);

– general and comprehensive studies of engineering and applied sciences (6536 publications);

– science studies (6436 publications).

But the scientific spheres, which are determined in the State Program "Knowledge-intensive technologies and techniques" as top-priority ones [2], are far from top positions by quantity of published offers, innovative projects, materials:

– biotechnologies take the 56th position in the list (from 69);

– medical investigations – the 15th position;

– investigations in the sphere of nature protection – the 23^{d} position;

– chemical industry and chemical technologies – the 28th position;

– investigations in the sphere of geophysics – the 60th position;

– nuclear energy – 67th position;

– astronomy – the 69th position;

– mapping and geodesy – the 64th.

Such amount of published work papers in professions and sciences, which are not directly accounted in the State Program as knowledge-intensive ones, proves that innovations and knowledge-intensive technologies shall be implemented to all spheres of the present-day society, and not only to the spheres stated in the Program. Probably, the amount of publications also indicates high demand on them in the scientific society.

However, international trends "Industry 4.0", "Robotic technologies", "Online education", transition to V and VI technological waves, require some other approach to determination of the main terms: "innovations", "innovation activities", etc.

Apparently, literal understanding of the terms "knowledge-intensive technology", "knowledge-intensive techniques" is typical for scientific society. They understood these terms as those, which are contained from two components:

– use of state-of-the-art scientific achievements in some specific sphere of human knowledge in course of development and application of a technology;

– use of any computer hardware project and advanced software in course of development of the technology.

Based on this point of view, it is natural that the scientific community does not understand existing restrictions to treat the developments as knowledge-intensive ones. For example, it is a problem to treat those developments as to knowledge-intensive, which are made by arts scientists, representatives of educational sphere and treated by themselves as knowledge-intensive ones.

But many of the described "innovations" do not offer any novelties related to such perspective technologies and techniques as:

– "more data";

– "internet of things;

– "virtual and alternate reality;

– 3D-printing;

– "printed electronics";

– "quantum computing";

– "distributed ledgers" etc.

In the context of global trend, research and development results are deemed the knowledge-intensive ones, if they relate to the above mentioned techniques and technologies.

Understanding of terms "innovation", "novation" is much more challenging. More often the scientific community treats them as the definitions enshrined in the Law "On the state innovation policy and innovation activities" [3]. As stated in the Law "Innovation activity is the activity intended to convert novelty into innovation", and "innovation is new or updated products, new or updated technologies, new services, new organizational or theoretical solution of industrial, administrative, commercial or other nature, which are put into civil circulation or used for own needs" [4].

Use of definitions seems somewhat non-conforming to the recent changes in the national policy. That is why such understanding of the main terms can be interpreted widely enough. In some cases, the techniques also known as III and IV category technologies, which do not respond to development of computer equipment, software, communications, in accordance with such approach, are defined as innovative.

Due to similar, close or alike interpretation of the term "innovation", there is confusion occur as well as publications concerning innovations, which are based on Aristotle's ideas, application of methods and techniques of "brainstorming", etc. [5].

As we think, this fact will become clear, when judging by "interpretation of law" known to legal science. It is a special governmental body or the legal scholarships, who are responsible for interpretation of law in legal studies. Understanding of the term "innovation", which is described above, seems to be somewhat as scientific interpretation and demonstrates the point of view of the scholarships concerning understanding of this term, its definition, sphere of application and effect.

But, as the current legislation indicates, any project can be recognized as an innovation only by the decision of the corresponding local or republican authority. However, the experts rely primarily on assumption on economic efficiency from use of this research development, material gain from its implementation.

Therefore, we should appeal to understanding of the term "innovation" resulting from vision of the special body – SCST (State Committee of Science and Technology). Based on the materials published on the official web-site [6], electronic databases "Etalon" and "Consultant", definitions of these terms shall include such meaning of the innovation as "goods" and " "marketable value of innovative solution", that will allow fixing one of the goals of development of new technologies, services, approaches – their sale in internal and/or external market. That is why the terms "innovation" or "marketable value of innovation" (any other term) shall show that research development is intended not for own needs (that is similar to typical natural economy), but rather for selling. A scholar – as a theorist and a practiser shall have a notion that the developed "goods" is intended for the market and that the developed, for example, educational service shall have features of goods.

It seems that the same point of view can correspond to the sphere of educational services provided on a paid basis. Moreover, in the present days, because of implementation of e-learning and other social and economic processes, which take place around the whole world. Competition in the sphere of such services becomes more intensive not only among universities inside of the country, but as well among domestic and foreign universities of near and far abroad.

All aforesaid proves the need to make one more change to understanding of the obtained terms. If we prepare the innovative product, goods, educational services, we have to consider the market conditions. More and more the market focuses on sales via Internet, application of technologies, which are treated as the technologies of V and VI category in accordance with economic structure, virtual educational resources. Costumed show and performances, cards with training materials, innovations, which are based on active use of paper carriers, will hardly withstand competition under nowadays conditions.

Global market of electronic educational services (e-learning), as far as it is known, annually earns billions of USD. It requires constant improvement of applied technologies. That is why the criteria of up-to-date educational system could include not only high scientific and methodical level, but also high technological level, what shall be recorded in amended Code of Education and in new educational standards 3+. That is why the definition of the term "innovation" shall, probably, fix the fact that the innovative development shall obligatory conform to the requirements and main provisions of the theory V and VI of the technological wave as well it shall rely on development of communications, computer equipment, etc.

We consider that if this interpretation of terms is accepted, the corresponding governmental bodies will have to inform the scientific community about new content of the specified terms, develop recommendations for publishing houses and editorial boards, which accept materials for publishing as well they will have to inform about the requirements to the materials published as innovative ones.

In addition, not always education requires innovative projects and developments. Very often there is a need to apply previously tested methods, methodology and approaches; new methods, approaches and techniques without the aim to create product or service for sale. In this case, it is possible to apply to these terms typical term "novel", or, provided by the Law, – "novelty" [3]. The criteria specified herein allow making distinction between the terms "knowledge-intensive", "novelty", "innovative activities", "innovations" in every-day consciousness preventing their mixing and innocent or fraudulent misrepresentation for the readers and consumers.

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