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FEATURES OF STUDYING THE ECOLOGICAL STATE OF THE DESOLATE REGIONS OF BUKHARA-KHIVA FOR THE SELECTION OF FIXERS OF MOBILE SANDS AND SOILS

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Abstract:

In this paper, we focused on the analysis of works devoted to the study of the composition and properties of highly dispersed (MSo) mobile soils and sands (MSe) to be fixed, the ecological consequence of the movement of fine soils in settlements of desert regions, methods of fixing (MSo) and (MSe) using a composition of local structure-forming agents, as well as chemical reclamation followed by phytomelioration.

Keywords: ecological consequence, mobile soils and sands

INTRODUCTION. Today, the environmental disaster of the Aral Sea region is strongly reflected in its surroundings, i.e., in the Republic of Karakalpakstan, Bukhara, Navoi and Khorezm regions. This is also complicated by the location on both sides of the Karakum and Kyzylkum deserts, which, during storms and strong winds, pile up and saline populated areas with finely dispersed clays, mineral salts, etc. Therefore, allergic and chronic diseases of people of different ages are widespread in this region.

The problem of fixing mobile soils (MS) and sands (S), solved in the Aral Sea region, showed low efficiency of using a composition of fixers imported from foreign countries for foreign currency. The reason for this phenomenon is probably the lack of knowledge of the mineralogical and chemical compositions, as well as the physico-chemical properties of PPG and P of the Bukhara-Khiva region [1].

In this paper, we focused on the analysis of works devoted to the study of the composition and properties of highly dispersed (MSo) and (MSe) to be fixed, the ecological consequence of the movement of fine soils in settlements of desert regions, methods of fixing (MSo) and (MSe) using a composition of local structure-forming agents, as well as chemical reclamation followed by phytomelioration.

For the rational organization of chemical reclamation and further phytomelioration of (MSo) and (MSe) in the Bukhara-Khiva region, it is necessary to study their location, compositions, properties and other characteristics of plant cultivation.

Bukhara region is located in the south-west of Uzbekistan in the lower reaches of the Zarafshan River. The territory of the region is a desert plain with separate elevations, more than 90% of the area of which is occupied by the sands of Kyzylkum. Currently, the land plot of the Bukhara region is 40.4 thousand square kilometers. It borders with the territory of the Khorezm region, in the south-west direction with Turkmenistan, in the north-east direction of Navoi and in the south-east direction with Kashkadarya regions, as well as at a short distance from the north-west with the autonomous Republic of Karakalpakstan [1].

The water resources of the Bukhara region are limited. There are two main rivers in the region – the Zaravshan and the Amu Darya. Only in the lower reaches of Zaravshan there are small, irrigated oases – Bukhara, Karakul and Gijduvan. The Amu-Bukhara and Amu-Karakul machine channels are connected to these oases.

The climate of the region is desert, sharply continental. Therefore, winters are very cold and quite severe, and summers are hot and dry [1], which is the result of the interaction of several factors. The geographical location of the region is of paramount importance in this regard. The Central Asian country is located in the inner parts of the Eurasian continent, but due to the fact that the territory of the Bukhara region is located in the middle of Central Asian deserts, therefore it has climatic features of southern deserts, and has a sharply continental desert climate with subtropical features.

Soil is the most important component of nature, a product in which living and inanimate beings are embodied. Desert-type soils do not form a single whole, but are scattered throughout the region. The nature of the parent rock, topography, chemical composition and depth of groundwater are factors on which soil types depend. In turn, soils have 2 main groups (deserts and oasis) under the influence of the degree of compaction [1].

Central Asia belongs to the subtropical hot zone of the soil-climatic province. The soil composition of the Bukhara region includes genesis and age deposits, irrigated automorphic, transitional and desert hydromorphic soils are located in it.

According to the mechanical composition, such soils are heavy and medium sandy. In the arable layer of marsh-meadow soils, the amount of humus is about 3%, according to the total reserves of phosphorus, as well as in terms of potassium, these soils are considered poor.

The desert zone of the Bukhara-Khiva region is dominated by desert-type plant species, the total number of which is 4148 species registered in Uzbekistan and 580 species belonging to 55 families (Granitov E.I. 1964). It should be noted among them a large number of endemic species, which were recorded in this region by a local scientist A.JI.Fayziev (1964) - 173 species of endemic plants of Central Asia [3].

There is another factor-wind, which has an impact on transboundary pollution. Over the past 40 years, the continuity of winds in the region has increased by 40 percent as a result of the drying up of the Aral Sea. As a result of this increase, with the wind, the natural environment receives an average of 300-400 kilograms of salts per hectare per year, where the proportion of water-soluble salts is 40-60%.

As a result of model experiments and studied reports, it was found that the dust rising from the dry part of the Aral Sea is 120 million tons. Salt is distributed in a diameter of up to 500 km, while the distance between the region and the Aral Sea is 130-270 kilometers. The entire territory of the region is occupied by a desert zone, which covers an area of 3.5 million hectares, covered with salt marsh and occupies about 120 square kilometers. At the same time, the total mass of salts is 167 million tons per year [4].

Khorezm region is located on the left bank of the lower Amu Darya plain in the northwestern part of the Republic of Uzbekistan, which borders with the Republic of Karakalpakstan in the north and northeast, with the Republic of Turkmenistan in the south and southwest. The climate of this part of the Republic is sharply continental, with cold winters with little snow, with temperatures falling to -30°C; with dry and hot summers when the temperature reaches $+45^{0}$C and above [4].

The soil of the Khorezm region has been inhabited to varying degrees since ancient times. Of great importance are the turbid waters of the Amu Darya, which enters the region and spreads over its entire area, it is she who normalizes soil salinization, improves and restores its structure, enriches nutrients that come from river mud [5].

For this reason, for thousands of years, the soil of the Khorezm region has been famous for sweet and delicious melons, watermelons, apples and grapes. On the instructions of the Government of our state, specific measures have been developed against salinization of the soil and reduction of salinity.

The southern border of the region passes through the sands of Karakum, which creates a completely different picture in these areas. Saxaul, oysters, rabbits and lollipops in the sand are not distributed everywhere. Grasses such as reeds, sedges, wormwood, wheatgrass grow around the natural lakes of the region and in the immediate vicinity of them. Vertebrates, foxes, sand cats, turtles, various rodents, as well as sparrows, blackbirds, wild pigeons and others live in this zone [5].

DISCUSSION. In accordance with this, on the basis of our research, we have scientifically substantiated the development of new approaches, reagents, determination of optimal conditions for the use of complex additives based on them, to reveal the mechanism of their action, both from the point of view of creating a cohesive dispersed structure - a crust that provides maximum prevention of deflation of surface salts, and from the position of possibility providing conditions that normalize the growth and development of salt-resistant plants the possibility of providing conditions that normalize the growth and development of salt-resistant plants [2].

Mineralogical, chemical, granulometric (dispersed) and others [5] physico-chemical analyses of MSo and MSe of the Bukhara-Khiva region have shown that the use of individual chemical reagents or industrial waste is not enough to consolidate them, since the structure formation of crusts requires the use of various components with directional properties. For example, to increase the mechanical strength of the crust, it is advisable to use solutions of sodium silicate, uniflok, K-4 and other structure–forming agents, and moisture resistance - it is necessary to use film-forming, water-resistant polymers and their derivatives.

The currently known components for fixing MSo and MSe chemical reagents and industrial waste are presented by us in the form of the following classification (Fig.1).

When selecting components for the composition of MSo and MSe fixers, the issues of environmental safety of the reagents used, their mechanical strength, water resistance, specific consumption for the formation of a crust unit, etc. were taken into account. At the same time, the possibility of maximizing the use of local raw materials, which require minimal transportation costs, was also taken into account.

Let's consider the chemical reagents and industrial wastes selected by us, suitable for obtaining a composition of MSo and MSe fixers in the Bukhara-Khiva region.

Lime is one of the main chemical reagents in the production **of** MSo and MSe fixers, the chemical formula of which has the following form - $Ca(OH)_2$. The republic has significant reserves of natural raw materials for the production of lime for various purposes. The use of lime in the composition of the fixative allows it to be enriched with the element of calcium, which is more difficult to dissolve in water than sodium, potassium, etc.

Calcium carbonate has the chemical formula $CaCO_3$ and is well soluble in water with the release of CO_2, which contributes to the formation of a loose structure in the MSo and MSe fixative. Calcium carbonate is a waste of the Kungrad soda plant in the Republic of Karakalpakstan.

Sodium silicate ($Na_2SiO_3 \bullet H_2O$) is produced in the Kuvasai Glass Factory for the needs of construction, household chemicals and other sectors of the country's economy. Sodium silicate in the MSo and MSe fixative serves as a structure-forming agent and protection against moisture penetration.

There are known structure-forming substances called preparations of the "K" series, obtained by saponification of polyacrylonitrile 4% NaOH of the PAA series from monomers of acrylic and methacrylic acids:

$$\left[-CH_2-\underset{\displaystyle CN}{\underset{|}{CH}}-CH_2-\underset{\displaystyle COONa}{\underset{|}{CH}}-CH_2-\underset{\displaystyle CN}{\underset{|}{CH}}- \right]_n \quad (1)$$

Organic fertilizers (OF) are waste from domestic sewers and livestock farms, which are currently arbitrarily used in agriculture. The choice of this fertilizer is dictated by the need to create favorable conditions for phytomelioration on the roadsides of the Bukhara-Urgench highway, which currently does not have the necessary organic recharge for plant cultivation. The joint consolidation of MSo and MSe and consideration of the problems of phytomelioration is an economically and environmentally beneficial solution to this issue.

Gossypole resin (GR) is a waste product of distillation of fatty acids of cotton soapstock and has a thick, dark brown ointment–like mass. GR practically accumulates at more than 20 large oil and fat enterprises of the republic and it is mainly used to obtain lubricants for metal surfaces, protective and insulating materials, etc. In our case, the use of GR is dictated by its ability to bind dispersed clay minerals and sands in the form of a crust with a certain thickness, mechanical strength, etc.

Oil sludge (OS) is a waste of the oil–producing and processing industries. It accumulates at the bottom of tanks, apparatuses, installations, pipelines, etc. OS by nature is a hydrophobic compound consisting of asphaltenes, resins, paraffins, ceresins, mechanical salts and impurities, which gives them multifunctional properties. Taking this into account, we have developed formulations of the composition of MSo and MSe fixers for the purpose of utilization of OS.

The alkaline and alkaline earth dispersed bentonites (DB) used consist mainly of minerals of the montmorillonite group. When wetting bentonite, water or other polar liquid molecules easily penetrate into the interpack space, causing its increase from 0.96 to 2.14 nm. At the same time, there is a significant increase in the volume of clay (swelling) and its dispersion to elementary particles.

Currently, there are huge reserves of bentonite clays of alkaline and alkaline-earth form in the Kattakurgan (Samarkand region), Tamdy-Tao and Navbakhor (Navoi region) deposits. Their use in obtaining MSo and MSe fixers in the Bukhara-Khiva region is not particularly difficult.

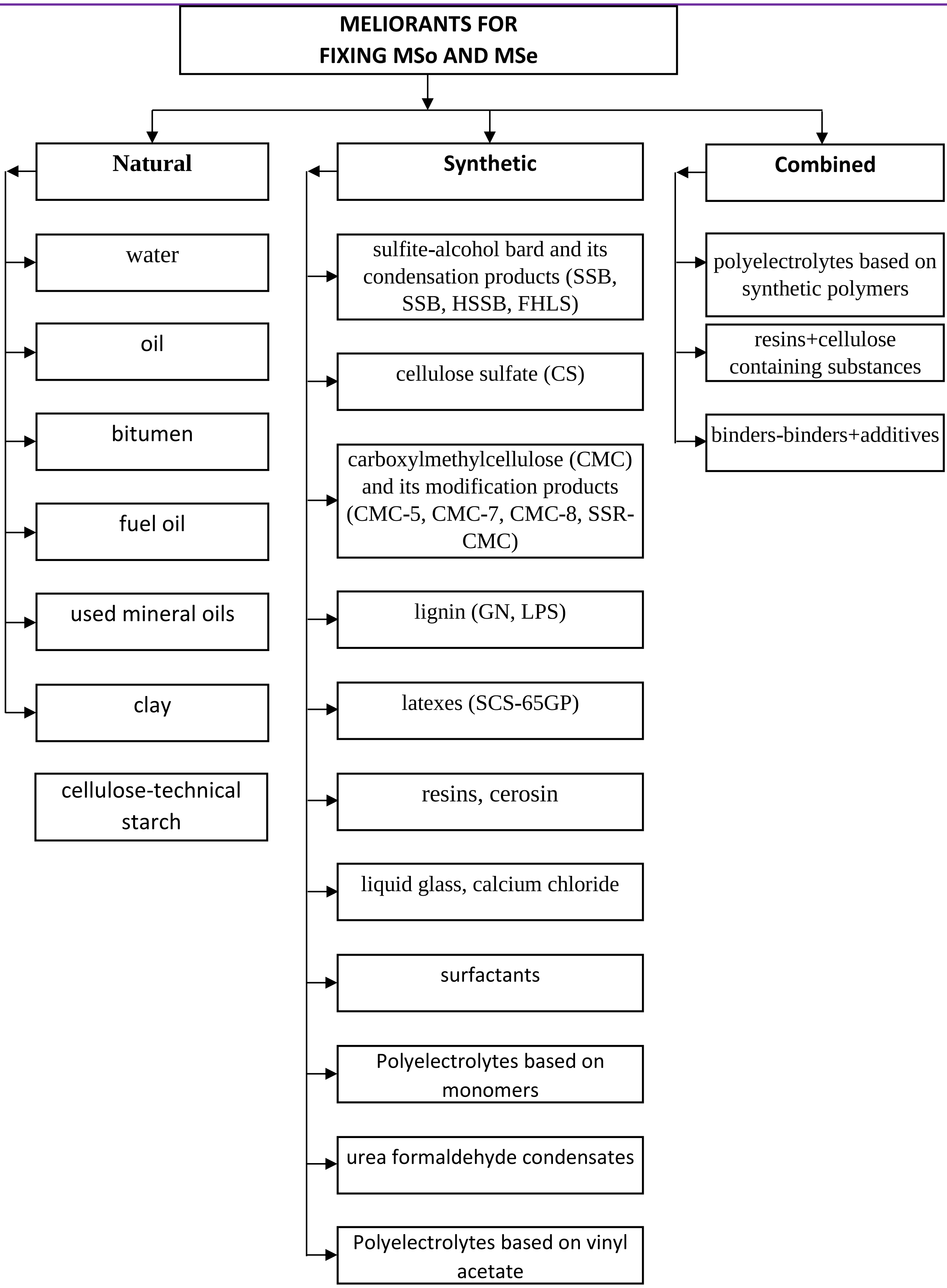

Fig. 1. Classification of components of MSo and MSe fixers

CONCLUSION. Analysis of literature sources on obtaining fixers of mobile saline sands and their use in various regions has shown that the selection of a structure-forming agent should be carried out taking into account their climatic characteristics, composition and properties of the fixed dispersions, their subsequent use in breeding the corresponding flora, etc. At the same time, the forming crust (film) must have a certain mechanical strength that does not prevent the further growth of planted plants. Moreover, the use of industrial waste as additives will not only reduce the cost of production and application of the developed fixers, but also dispose of them without damaging the ecology of the region.

Thus, on the basis of local raw materials, the necessary chemical reagents and industrial waste have been selected, which are included in the composition of the MSo and MSe fixers of the Bukhara-Khiva region.

A comprehensive solution to this environmental problem in the Bukhara-Khiva region will expand agricultural land, reduce soil salinization in the surrounding lands and improve their ecological situation.

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