ANNOTATION

to the thesis of **Abubakirova Azhar Abdugapparovna** on the topic "Development of biotechnological processes of the production of cosmetological preparations based on plant and salt-containing raw materials of Southern Kazakhstan" for the degree of Doctor of Philosophy (PhD) in specialty **6D070100-Biotechnology**

General characteristics of the research. In the dissertation work, the biotechnological possibilities of obtaining cosmetic products using plant and salt-containing raw materials of the south of Kazakhstan are investigated.

Relevance of the study. The most developed countries in the world in the production of cosmetic products in all well-known branches of cosmetic biotechnology and medicine are the United States, South Korea, China, India and some European countries. The cosmetology industry in the Republic of Kazakhstan is an underdeveloped economic sector among various branches of biotechnology. In recent years, the demand for products that are environmentally friendly and contain natural ingredients has been growing in the field of cosmetology. In accordance with current trends, the main ingredients of cosmetic products have a natural character, consisting of extracts of medicinal plants rich in minerals and biologically active substances (BAS), which have a great positive effect on human skin.

The southern region of Kazakhstan is rich in various stocks of medicinal plants, more than 500 species of which are widely used in pharmacology. Here are such endemics as santonica (Artemisia cina), licorice (Glycyrrhiza glabra L.), Camel thorn (Alhagi pseudalhagi) has long been used in traditional medicine. But, nevertheless, the usefulness of the richest natural reserves of medicinal plants, the possibility of their use in cosmetology production is not fully understood.

In addition, it is currently more profitable to use natural salt raw materials instead of additional substances contained in 95% of cosmetic products, since the negative effect of such substances on human skin has long been proven. Such profitable raw materials are mineral groundwater, sea water, brine of salt lakes, salt mud and concentrated salt minerals. The use of salts and mud from the Dead Sea, lakes of France and Gabon for cosmetic purposes is world-famous. The reason for the widespread use of magnesium, calcium, nickel and chromium and other minerals contained in salt raw materials and Dead Sea mud is due to the biological activity of these substances on human skin. They can have a moisturizing, anti-inflammatory and antioxidant effect on the skin. In addition, salt components are considered special corrective components in the composition of cosmetic products that have an effect when used daily, used to treat skin defects and various diseases, such as psoriasis, atopic dermatitis, rosacea.

The importance of our research paper lies in the development of effective methods for obtaining cosmetic products, using all the available opportunities of biotechnology combined with the raw materials of our country, which remain without proper attention today.

Object of research: salt-containing raw materials of Lake Zhaksykylysh, located in the Kyzylorda region, 13 medicinal plants of the flora of the South Kazakhstan region and 7 plant species with aromatic essential oils as refreshing and olfactory plants, as well as plants that make up hydro-macrophytic ecological biotopes of the Turkestan region for phytomeliorative treatment.

Objective: to develop biotechnological processes for the production of cosmetic preparations based on plant and salt-containing raw materials in Southern Kazakhstan.

To achieve the goal of the study, the following tasks were set::

- Determination of physico-chemical and biological characteristics of salt-containing raw materials of lakes in the south of Kazakhstan and medicinal plants growing in the region;
- Selection of the effective composition of cosmetic product prototypes;
- Development of biotechnological processes of a low-power enterprise for the production of cosmetology products;
- Development of a method for biological wastewater treatment of pharmaceutical and cosmetology enterprises;

Scientific novelty of the work:

1. It was established for the first time that the salt-containing raw materials of Lake Zhaksykylysh consist of halite, astrakhanite, hexahydrate, gypsum and mirabilite, the share of halide in the raw material composition is equal to 98,8±3,4% - 99,4±2,7%. The microflora consists of heteretrophes (1,1 ±01)×104-(7,1±07)×104 KTB / g) and endobacteria (0,26±002)×103 - (3,0±03)×103 KTB / g).

2. Five types of landscape at the bottom of the dried-up Aral Sea were identified for the first time, which were formed during different periods of sea drying and depending on the elements of the seabed relief. The vegetation of these landscapes is represented exclusively by salt-tolerant species of xerophytic flora. Members of the Amarantaceae, Asteraceae, Poaceae, Fabaceae, Zygophyllaceae, Caryohhollaceae, Brassicaceae, Primulaceae, Plumbaginaceae, Plantaginaceae, Cyperaceae, Poligonaceae, Indaceae, and Juncaceae families were found in geomorphological structures, of which 13 medicinal plant species were recognized as essential for cosmetology. As a result of the examination of 8 species of these medicinal plants by the HS-SPME coefficient and complete biochemical analyses conducted by the chromatographic method, 176-206 organic compounds were detected. Based on the results of research, it is proved that these plant extracts are suitable for use in cosmetic products;

3. The first prototypes of 16 cosmetic products were obtained.

4. A biotechnological scheme for obtaining cosmetic products based on salt-containing and vegetable raw materials of the Southern region of Kazakhstan has been developed for the first time.

5. A biotechnological method of treating wastewater generated as a result of pharmaceutical and cosmetology production, consisting of the stages of biocoagulation and phytoremediation, was developed for the first time.

The degree of validity and reliability of the dissertation work. The results obtained in the course of the study were proved as a result of statistical processing of microbiological, physico-chemical, X-ray, microscopic methods and experimental data. In order to carry out the planned research and biotechnological experiments, special certified methods, state standards and standards of the Republic of Kazakhstan were used. The equipment and materials used in the study meet the requirements of regulatory and technical documents

The main provisions submitted for defense:

1. The results of the analysis showed that the salt-containing raw materials of Lake Zhaksykylysh in the Aral region in most cases consist of halite, astrakhanite, hexahydrate, gypsum and mirabilite salts, the proportion of sodium chloride in which (NaCl) is equal to 98,8±3,4% - 99,4±2,7%.

2. The vegetation in the area of the Aral sea forms five landscapes during different periods of sea drying and depending on the elements of the seabed relief, plant communities of which are formed in morphological structures under the influence of salt and contain representatives of 14 families, including 13 species of medicinal plants. According to the results of research on the HS - SPME coefficient, the composition of 176-206 organic compounds found in 8 species of medicinal plants is found to be suitable for use in cosmetic products;

3. Compositions of 16 cosmetic products based on plant and salt-containing raw materials obtained in the south of Kazakhstan and plant extracts were developed, the first prototypes of which were tested in model and native conditions with a positive valuable result.

4. The biotechnological scheme for obtaining cosmetic products based on salt-containing and plant raw materials in the south of Kazakhstan is applicable for the production of cosmetic products in industrial scales.

5. Treatment of wastewater produced by bacterial culture fluid and the use of hydro-macrophytes of the Turkestan region for phytomeliorative treatment increases the degree of water purification from 72.35 to 100%.

Theoretical and practical significance of the research. The theoretical significance of the study consists in studying the influence of the level of salinity of the environment on the biodiversity of biological objects, determining the physico-chemical parameters of salt-containing raw materials, accurately determining the biochemical composition of medicinal plants, determining the influence of a complex developed on the basis of plant extracts and salt raw materials on the morphological parameters of the skin. Studying the flora of Lake Zhaksykylysh makes it possible to assess the ecological situation of the local ecosystem, understand the reasons for the formation of five unique landscapes, and anticipate the patterns of changes in plant communities with further salinization of the soil as a result of wind erosion in the region. This will contribute to the creation of small industrial enterprises and employment of the local population by forming the proposed biotechnological production, obtaining competitive domestic products based on domestic raw materials.

Approbation of the results of the thesis. The main results and conclusions of the research work were discussed at the following international conferences:

"Fundamental and applied scientific research: current issues, achievements and innovations", 23rd International Scientific conference (Penza, 2019), IX International Scientific and practical conference of students "Ecological biotechnology and bioenergy aspects and innovations" (Almaty, 2021); Polish-Kazakh 6th Interdisciplinary International Scientific and Practical Online Conference on Chemistry and Biology (Poznan,2021), materials of the II International Scientific and Practical Conference "Topical issues of modern science, society and education" (Kharkiv, Ukraine, 2021).

Publications on the research topic. On the topic of the dissertation, 10 scientific papers were published at international and republican scientific and practical conferences, 2 articles in a journal included in the international Scopus database, 1 article in a publication recommended by the Committee for control in the field of Education of the Ministry of Education and Science of the Republic of Kazakhstan, 1 article in a peer-reviewed scientific electronic journal, 1 article in a journal included in the RSCI database, and 2 innovative patents were obtained on the research topic.

Personal contribution of the dissertation candidate. All experimental studies were conducted with the personal participation of the author. The author individually analyzed the literature data on the topic of the study, processing and analyzing the results of the study, writing and formatting the manuscript of the dissertation.

Connection with the plan of the main scientific works. The dissertation work was carried out within the framework of grant scientific and technical projects funded by the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan 1) "Development of technology for the production and acquirement of prototypes of new cosmetic products based on pharmacological studies of domestic saline and vegetable raw materials" (2018-2020), (state registration № 0118RK01370), 2) "Optimization of the functioning of decentralized biological wastewater treatment systems in the pharmaceutical and cosmetic industry by selecting the composition of phytomeliorant plants" (2021) MES RK AP009563499.

Scope and structure of the thesis. The dissertation consists of an introduction, 3 chapters, a list of 186 references and footnotes, contains 129 pages, 42 figures, 33 tables.