

Brief information about the project

Title	Grant No. AP25796125 “Investigation of the Phytopreparative Potential of Medicinal Shrubs Growing in Southeastern Kazakhstan.”
Relevance:	The obtained scientific results and conceptual approaches are aimed at investigating the general pharmaceutical properties of shrub species of industrial importance, namely <i>C. tianschanica</i> and <i>R. schrenkiana</i>. At present, the development of medicinal products requires adherence to modern standards for the preclinical evaluation of new pharmacological compounds. Within the framework of this research project, efforts will be undertaken to improve the scientific and organizational aspects of preclinical studies of new drugs, in accordance with the requirements for introducing domestic medicinal products and their outcomes into the pharmaceutical market. In compliance with regulatory requirements governing the circulation of medicinal products, experimental studies on animals will be conducted. The research is grounded in key principles aimed at ensuring the development of effective and safe pharmaceutical agents, taking into account the latest advances in medical science and industrial technologies.
Objective:	To conduct a geobotanical characterization of medicinal shrubs (<i>C. tianschanica</i> and <i>R. schrenkiana</i>) growing in Southeastern Kazakhstan; to investigate the effects of their extracts on the organism of animals with diabetes mellitus; and, based on the evaluation of the efficacy of major biologically active compound groups, to assess the potential for expanding the national raw material base of promising medicinal resources for use in the pharmaceutical and healthcare sectors, as well as in economically and industrially significant applications.
Objectives:	To achieve the stated goal, the following key objectives will be accomplished: 1. To determine the resource base and phytocoenotic characteristics of <i>R. schrenkiana</i> and <i>C. tianschanica</i>; 2. To investigate the phytochemical composition of the collected plant raw materials, identify the major biologically active compounds of <i>R. schrenkiana</i> and <i>C. tianschanica</i>, and conduct anatomical and morphological studies of these plants; 3. To perform a series of experimental studies under <i>in vitro</i> conditions to evaluate the effects of the major biologically active compounds obtained from the studied plants on the organism of animals with experimentally induced diabetes mellitus; 4. To assess the antioxidant effects of these plant extracts on the osmotic resistance of erythrocyte membranes and on the level of lipid peroxidation in liver microsomes; 5. To carry out a comprehensive evaluation of the major biologically active compounds in <i>R. schrenkiana</i> and <i>C. tianschanica</i> and to

	develop recommendations for the formulation of phytopreparations; 6. To disseminate the research findings through publication of at least two articles in peer-reviewed scientific journals ranked within the top three quartiles of the Web of Science database or with a CiteScore percentile of at least 50 in the Scopus database. In addition, project participants plan to present the results at annual scientific conferences related to the project topic. To accomplish these objectives, the project is planned to progress along the Technology Readiness Level (TRL) scale—from TRL 1 (identification of the potential for developing new technology at the level of fundamental research) to TRL 4 (experimental validation and development). Specifically, the work will encompass the determination of the resource base and phytocoenotic features of industrially significant medicinal shrubs (<i>R. schrenkiana</i> and <i>C. tianschanica</i>), followed by the integration of the structural and technological components of their major biologically active compounds. This will include conducting <i>in vitro</i> experimental studies to assess the effects of active compounds on animals with experimentally induced diabetes mellitus, developing recommendations for phytopreparation formulation, and characterizing their functional properties, as well as publishing the results in international scientific journals. Thus, the main scientific and technical outcomes of the project will include laboratory and technological documentation of geobotanical, phytochemical, and biomedical processes, as well as the development of methods and approaches for producing environmentally friendly and effective phytopreparations based on the conservation of biodiversity and the sustainable use of bioresources.
Expected and Achieved Results:	The research results are planned to be published in peer-reviewed scientific journals within the project's research field in the following forms: 1. At least two (2) articles in journals ranked within the top three quartiles of the Web of Science database by impact factor, or in journals with a CiteScore percentile of at least 50 in the Scopus database; 2. Systematization of research findings in the form of methodological recommendations, with the possibility of publication as a monograph by national publishing houses; 3. Patent acquisition. Based on the research outcomes, patents may be obtained at the national and/or international levels; 4. Development of scientific, technical, and engineering documentation. The project results may be applied in pharmaceutical development based on studies of biologically active compounds contained in medicinal products in accordance with international standards, as well as in the preparation of analytical regulatory documentation of the Ministry of Health of the Republic of Kazakhstan for medicinal plant raw materials; 5. The research results will include an in-depth investigation of the antioxidant and antidiabetic effects of extracts from <i>R. schrenkiana</i> and <i>C. tianschanica</i> on animal blood, including their influence on the osmotic resistance of erythrocyte membranes. Medicinal plants of

	Southeastern Kazakhstan are of great importance for the pharmaceutical and medical industries. The identification of their therapeutic properties will contribute to the development of new phytopreparations through further clinical and biological studies, as well as to the advancement of biodiversity conservation, ecology, and the pharmaceutical and medical industries of the Republic of Kazakhstan. The obtained data may be used for the development of plant-based preclinical phytopreparations for the treatment of patients with diabetes mellitus, as well as for use as dietary supplements or ingredients. In addition, project outcomes may be disseminated through publications in national mass media and the preparation of scientific and methodological guidelines; 6. Impact of the expected results on the development of science, technology, and related fields: The results can be utilized by educational institutions, as well as botanical and pharmacopoeial organizations. The isolation of biologically active compounds from medicinal plants growing in Kazakhstan has significant practical importance for public health. Economic benefits may be achieved through the rational use of natural resources of medicinal plants in the pharmaceutical industry. The social impact includes the development of local medicinal plant resources and the improvement of public health in the region. In accordance with reforms in the field of medicinal product circulation, the project is based on key principles that include conducting experimental studies on animals and ensuring the development of effective and safe pharmaceutical products, taking into account modern advances in medical science and industrial technologies. Due to the lack of modern, environmentally friendly domestic anti-inflammatory and antidiabetic products in the pharmaceutical market of Kazakhstan, there is a high demand for new, eco-friendly, and economically efficient medicines. The successful implementation of the project objectives will expand the potential for practical medical application of the selected medicinal plants and provide a basis for the development of anti-inflammatory and antidiabetic phytopreparations, as well as for the preparation of protocols for their clinical trials; 7.b Additional direct and indirect results of the project, including qualitative and quantitative indicators: For the first time, in accordance with international standards, a comprehensive assessment will be conducted of the geobotanical, biological, phytochemical, and biomedical characteristics, as well as the medicinal properties, of <i>R. schrenkiana</i> and <i>C. tianschanica</i> growing in the mountainous regions of Southeastern Kazakhstan.
Full names of the research team members, their identifiers (Scopus Author ID, Researcher ID, ORCID, if available), and links	Straiyl Sayagul PhD H-index Scopus – 5, H-index Web of science-2, Web of Science Researcher ID -ABE-9770-2021 ORCID ID - https://orcid.org/0000-0002-6237-4388

to the corresponding profiles.	
List of publications (by research field) with corresponding references/links provided.	1. A. Ydyrys, M. Molsadykkyzy, S. Syraiyl, Kh. Kidirbayeva, B. Raiymbekova, S. Barun, A. Aralbaeva6, G. Atanbaeva. Ecological And Phytochemical Composition Of Gnaphalium Kasachstanicus Kirp. & Kuprian. SABRAO Journal of Breeding and Genetics 57 (2) 792-803, 2025. Web of Sciences Q2 http://doi.org/10.54910/sabao2025.57.2.35. 2. Alibek, Y., Abdolla, N., Syraiyl, S., Masimzhan, M., Abdrasulova, Z. Cultivation and resource of Artemisia schrenkiana L. for increased pharmaceutical perspective. Research on Crops, VOLUME 24(ISSUE 1 (MARCH)). 2023. Q3 Scopus 46% https://doi.org/10.31830/2348-7542.2023.ROC-881 3. Alibek Ydyrys, Gulzhan Zhamanbayeva, Nazgul Zhaparkulova, Arailym Aralbaeva, Gulnaz Askerbay, Zhanar Kenzheyeva, Gulmira Tussupbekova, Sayagul Syraiyl, Raushan Kaparbay, Maira Murzakhmetova. Systematic Assessment of the Membrane-Stabilizing and Antioxidant Activities of Several Kazakhstani Plants in the Asteraceae Family. Plants 2024 13(1), 96. doi: 10.3390/plants10040666. PMID: 33808498. Scopus Q1 https://doi.org/10.3390/plants10040666 4. S. Syraiyl, A. Ydyrys, A. Aksoy, R. Aitbekov, M.T. Imanaliyeva. Phytochemical composition and antioxidant activity of three medicinal plants from southeastern Kazakhstan. IRSTI 34.39.27. International Journal of Biology and Chemistry 15, № 1, 73 (2022). p. 75-79. International Journal of Biology and Chemistry. Web of Sciences Q4 https://doi.org/10.26577/ijbch.2022.v15.i1.08 5. Sayagul Syraiyl, Alibek Ydyrys, Gulnaz Askerbay, Rinat Aitbekov. Chemical composition and biological uses of <i>Artemisia schrenkiana</i> Ledeb. BIO Web of Conferences 100, 04039 (2024) https://doi.org/10.1051/bioconf/202410004039 IFBioScFU 2024. Web of Sciences Q4 https://doi.org/10.1051/bioconf/202410004039