Brief information about the project

Title	AP25796125 Study of the phytopharmaceutical potential of medicinal shrubs growing in Southeastern Kazakhstan
Relevance	The obtained scientific results and conclusions are aimed at studying the general pharmaceutical properties of the industrially significant shrub plants *C. tianschanica* and *R. schrenkiana.* Currently, the development of medicinal products requires compliance with modern preclinical evaluation standards for new pharmacological agents. Within the framework of this research project, efforts are being made to improve the scientific and organizational aspects of preclinical studies of new domestic medicinal products in accordance with the requirements for introducing their results to the pharmaceutical market. In line with the regulatory requirements in the field of pharmaceutical circulation, experimental studies on animals are conducted. The research is based on the main principles of ensuring the development of effective and safe drugs that meet the core objectives of modern medicine and industrial technology advancements.
Goal	To conduct a geobotanical description of medicinal shrubs (*C. tianschanica* and *R. schrenkiana.*) growing in the southeastern region of Kazakhstan, to study the effects of their extracts on the organisms of animals with diabetes, and to determine the effectiveness of key biological compounds, with the aim of exploring opportunities to expand the base of new promising medicinal raw materials for use in the pharmaceutical and healthcare sectors, as well as in industries of economic and industrial importance to the country.
Tasks	To achieve the stated goal, the following key objectives must be accomplished: To identify the resource base and phytocoenotic characteristics of *C. tianschanica* and *R. schrenkiana.* plants; To investigate the phytochemical composition of the collected plant raw materials, determine the key biological compounds in *R. schrenkiana* and *C. tianschanica*, and conduct anatomical and morphological studies of the plants; To carry out a series of experiments under in vitro conditions to evaluate the effects of the key biological compounds derived from the studied plants on animals with experimentally induced diabetes; To assess the antioxidant activity of these plant extracts by studying their effects on the osmotic resistance of erythrocyte membranes and the level of lipid peroxidation in liver microsomes; To perform a comprehensive evaluation of the key biological compounds found in *C. tianschanica* and *R. schrenkiana.*, and to develop recommendations for the formulation of phytopreparations; To publish at least two (2) research articles based on the project's scientific direction in peer-reviewed journals indexed in the Web of Science (within the top three quartiles by impact factor) or in Scopus

	(within at least the 50th percentile by CiteScore). Additionally, project participants plan to attend annual scientific conferences dedicated to the project topic. To implement the objectives of the project, we plan to work across a range of Technology Readiness Levels (TRL), starting from TRL 1 (identification of potential for new technology in fundamental science) up to TRL 4 (experimental development). Specifically, the work includes identifying the resource base and phytocoenotic characteristics of industrially significant medicinal shrubs (*R. schrenkiana* and *C. tianschanica*), integrating the structural and technological components of their key biological compounds, conducting serial in vitro experiments to assess the effects of the extracted active compounds on animals with experimentally induced diabetes, and developing recommendations for phytopreparation formulation. The project will also address the identification of use-case characteristics and the publication of research results in international scientific journals. Thus, the main scientific and technical outcomes of the work will include documentation of laboratory and technological geobotanical, phytochemical, and biomedical processes, as well as methods and approaches for the production of environmentally friendly and effective phytopreparations, based on biodiversity conservation and the sustainable use of bioresources.
Expected and Achieved Results	The research results are planned to be published and disseminated through the following scientific outputs in accordance with the scientific direction of the project: At least two (2) articles will be published in peer-reviewed scientific journals indexed in the Web of Science database within the top three quartiles by impact factor, or in journals indexed in Scopus with a CiteScore percentile of at least 50; The research findings will be systematized into methodological recommendations and may be published as a monograph by a domestic publishing house; Patents: Based on the expected outcomes, it is possible to obtain national or international patents; Scientific-technical and design documentation: The results of this project may be used in the preparation of Analytical Normative Documents (ANDs) for medicinal plant raw materials by the Ministry of Health of the Republic of Kazakhstan. The documentation will be based on international standards and include the pharmaceutical development of medicinal products containing key biological compounds;

	The study will explore in depth the antioxidant and antidiabetic effects of R. schrenkiana and C. tianschanica extracts, including their influence on animal blood and the osmotic resistance of erythrocyte membranes. Medicinal plants in the southeastern region of Kazakhstan hold significant potential for research in the pharmaceutical and medical industries. The identification of therapeutic properties is expected to lead to the development of new phytopreparations through future clinical and biological studies, contributing to the advancement of biodiversity conservation, ecology, pharmacy, and the medical industry in Kazakhstan. The data obtained on R. schrenkiana and C. tianschanica may be used to develop preclinical plant-based phytopreparations for the treatment of diabetes and could also be applied as dietary supplements or ingredients. Articles may be published in Kazakhstani mass media, along with the release of scientific and methodological recommendations; Impact on the development of core scientific directions and related fields of science and technology: The results can be used by academic institutions, botanical and pharmacopoeial organizations. Extracting key biological compounds from medicinal plants within Kazakhstan has practical significance for public health. From an economic perspective, these results support the rational use of natural resources in the pharmaceutical industry. The social impact includes the development of local medicinal plants and improvements in the health of the local population. In accordance with ongoing reforms in the pharmaceutical market, experimental studies on animals and the development of effective and safe drugs that consider current achievements in medical science and industrial technology will be carried out in line with key research principles. Due to the lack of domestic, eco-friendly, anti-inflammatory and antidiabetic pharmaceutical products in the Kazakhstani pharmaceutical market, there is a high demand for new, ecologically clean, and economically efficient domestic medicinal preparations. Successful implementation of the project objectives will enhance the potential use of the selected medicinal plants in practical medicine and may serve as a foundation for the development of phytopreparations with anti-inflammatory and antidiabetic properties, including the preparation of protocols for their clinical trials; Other direct and indirect project outcomes, with qualitative and quantitative indicators, will be additionally outlined. For the first time, in accordance with global standards, the geobotanical, biological, phytochemical, and biomedical characteristics and therapeutic properties of R. schrenkiana and C. tianschanica species growing in the mountainous regions of southeastern Kazakhstan will be

	assessed.
Names and Surnames of Research Group Members with Their Identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and Links to Corresponding Profiles	Syraiyl 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
Publications list with links to them	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/sabrao2025.57.2.35. 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 andChemistry. **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 *Artemisia schrenkiana* 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
Patent information	-