

Brief information about the project

Name of the project	AP13067924 «Comprehensive studies of some promising medicinal plant species from the Asteraceae family for industrial development»
Relevance	The production of medicinal products with a focus on the national industry is closely related to the development of the pharmaceutical industry. The collection and cultivation of plants that contribute to the chemical-pharmaceutical industry can lead to the expansion of an exact and rich raw material base. The types of useful plants introduced into production for research purposes are closely related to the biological characteristics and phytochemical composition of the flora. In order to study and assess the potential of new plant species in our flora, thorough and extensive research is needed. Currently, only 3-4% of the more than 6000 species of plants in our flora are used for pharmaceutical production. Among the less studied types, there are representatives of the Asteraceae family as well
Purpose	The goal of the project is to study 3 industrially important medicinal plants (<i>A. schrenkiana</i> , <i>G. kasachstanicum</i> and <i>A. tomentosum</i>) of the Asteraceae family growing in Kazakhstan and to consider the possibilities of expanding the raw material base based on phytochemical analyses, ecological-coenotic and resource studies.
Objectives	1. Carrying out phytocenotic characteristics of plant communities in which studied medicinal plants For this task, phytocenotic characteristics of plant communities involving medicinal plants, this project aims to gather various types of information to understand the ecological context and dynamics of these communities will be carried out. The plant species present in the community, both medicinal, non-medicinal and which medicinal plants are dominant, and which are less common will be identified. The diversity of medicinal plants present in the community will be assessed. The structure of the vegetation, including the height, density, and spatial arrangement of plants within the community will be described. The interactions between medicinal plants and other plant species, such as competition for resources or facilitation will be studied. The cultural and traditional uses of medicinal plants by local communities, including harvesting practices, medicinal preparations, and cultural significance will be explored. By conducting phytocenotic characteristics, can gaining insights into the ecological relationships and environmental conditions that influence the growth and distribution of medicinal plants within plant communities. These results can inform conservation efforts, sustainable management practices, and the utilization of medicinal plant resources for various purposes.

2. Conducting macroscopic studies of the studied medicinal plants,

Expecting results or aspects during this stage; the overall appearance and morphology of the medicinal plant, including its size, shape, branching pattern, and growth form (e.g., herbaceous, shrub, tree) will be described. Some organs of the plant, noting their shape, size, arrangement, venation pattern, texture, color, and any specialized anatomical structures will be examined. Any variations in macroscopic characteristics among individuals of the same species or among different locations, which may be influenced by abiotic factors, environmental conditions, or developmental stages will be considered. By conducting macroscopic studies of medicinal plants, can gaining valuable information about their physical characteristics, which is essential for accurate identification, authentication, and quality control in various applications, including herbal medicine, botanical research, and horticulture.

2. Determination of the main biologically active compounds of the studied medicinal plants medicinal plants.

Expecting results or aspects during this stage: the overall appearance and morphology of the medicinal plant, including its size, shape, branching pattern, and growth form (e.g., herbaceous, shrub, tree) will be described. Some organs of the plant, noting their shape, size, arrangement, venation pattern, texture, color, and any specialized anatomical structures will be examined. Any variations in macroscopic characteristics among individuals of the same species or among different location, which may be influenced by abiotic factors, environmental conditions, or developmental stages will be considered.

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3. Conducting serial experiments on experimental animals for acute and chronic toxicity of chemical fractions obtained from researched plants.

When conducting serial experiments on experimental animals to assess acute and chronic toxicity of chemical fractions obtained from researched plant extracts, several expected results and observations may arise. The median lethal dose (LD50) of the chemical fractions through dose-response studies. LD50 is the dose of a substance that causes death in 50% of the treated animals within a specified time will be establish. Any immediate adverse effects or clinical signs in the experimental animals

	<p>following acute exposure to varying doses of the chemical fractions will be observed and documented. These signs include changes in behavior, neurological symptoms, respiratory distress, or mortality. Histopathological examinations of major organs to identify any tissue damage, inflammation, necrosis, or other pathological changes induced by the chemical fractions will be conducted. Blood parameters, including red blood cell count, white blood cell count, hemoglobin levels, and hematocrit, to detect any hematological abnormalities associated with chronic exposure to the chemical fractions will be assess. By conducting serial experiments on experimental animals to evaluate acute and chronic toxicity of chemical fractions obtained from plant extracts, can assess the safety profile of these compounds and inform risk management strategies for their safe use in pharmaceuticals, herbal medicines, or other applications.</p>
<p>Expected and achieved results</p>	<p>In this project, the development of natural resources of new promising 3 species of plants belonging to the Asteraceae family for use in the food, pharmaceutical, perfumery and cosmetic industries of industrial, national and economic importance, growing in Kazakhstan, will be studied.</p> <p>As a result of the implementation of this project, it will have a great scientific and practical, production value not only at the domestic level, but also on a global scale, since the results of the project will contribute to the production of highly effective drugs of plant origin, on the basis of which safe drugs with pronounced immunomodulating activity will be developed.</p> <p>The implementation of the project results in production will contribute to the improvement of the country's economic situation, the development of the scientific industry, the strengthening of exports and the strengthening of its reputation on the international pharmaceutical market.</p> <p>The potential social significance of the project is related to providing the domestic pharmaceutical market with a number of domestic medicinal plants of high quality and significantly more affordable compared to foreign analogues, for use in medicinal kits and raw materials for the production of domestic phytopreparations and will also allow to contribute to the progressive innovative development of the economy of the Republic of Kazakhstan. Participation of young students in the project will improve the quality of education and prepare highly qualified specialists, which will affect their career growth in the future. The results of research are in the field of effective use of medicinal plant resources, increase of raw material reserves, and the obtained biologically active natural compounds (depending on their activity) can be used as medicines, food additives or ingredients for the treatment of various diseases.</p>

	<p>Conducting studies of biological, chemical and pharmacological properties of 3 industrially important medicinal species belonging to the Asteraceae family will become the main factor of complex studies in the production of highly scarce domestic drugs from them. Analysis of the chemical composition and immunomodulating activity of biologically active substances obtained from domestic species of plants will probably replace imports and help domestic producers to solve the problems of their sufficiency for the effective use of plant resources of their country. If it is proven that new compounds, which are not described in the literature, are obtained from objects of research, they will be included in the global data bank. The results obtained during the implementation of this project will serve as the basis for a candidate's dissertation and a study guide for students. The results of the project are systematized and printed in the form of methodological recommendations, monographs will be published in Kazakh publishing houses and can be used in the preparation of analytical normative documents of the Ministry of Health of the Republic of Kazakhstan on medicinal plant raw materials.</p>
<p>Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles</p>	<ol style="list-style-type: none"> 1. Ydyrys Alibek, PhD doctor, H-index Scopus – 12, H-index Web of science-9, Web of Science Researcher ID- M-5723-2013, https://orcid.org/0000-0002-5561-0856, Scopus Author ID - 57203985421 2. Abdolla Nurshat, PhD doctor, H-index Scopus – 6, H-index Web of science-5, Web of Science Researcher ID - R-2193-2016 https://orcid.org/0000-0002-4769-7824. Scopus Author ID - 57194001982. 3. Zhamanbayeva Gulzhan, PhD doctor, H-index Scopus – 2, H-index Web of science-2, Web of Science Researcher ID - A-5192-2015 https://orcid.org/0000-0002-7450-2746 Scopus Author ID - 56431136700 4. Seilkhan Ainur, PhD doctor H-index Scopus – 7, H-index Web of science-5, Web of Science Researcher ID - ABC-9225-2021 https://orcid.org/0000-0002-3252-0049 Scopus Author ID - 57191849740 5. Abdrassulova Zhanna. PhD doctor, H-index Scopus – 4, H-index Web of science-1, Web of Science Researcher ID - ABG-5100-2020 https://orcid.org/0000-0002-2072-5901 Scopus Author ID - 56128035400 6. Syrail Saiagul, PhD student, H-index Scopus – 3, H-index Web of science-1, Web of Science Researcher ID - ABE-9770-2021 https://orcid.org/0000-0002-6237-4388 Scopus Author ID - 57222577939 7. Masimzhan Muratzhan – Master of natural sciences, H-index Scopus – 2, Web of Science Researcher ID -ABC-9225-2021, https://orcid.org/0000-0002-3252-0049, Scopus Author ID – 57191849740

	8. Askerbay Gulnaz, 1 st year PhD student, Web of Science Researcher ID -JYC-5414-2024. https://orcid.org/0009-0005-3495-2960
List of publications with links to them	1. Ydyrys, Alibek, Gulzhan Zhamanbayeva, Nazgul Zhaparkulova, Arailym Aralbaeva, Gulnaz Askerbay, Zhanar Kenzheyeva, Gulmira Tussupbekova, Sayagul Syraiyl, Raushan Kaparbay, and Maira Murzakhmetova. (2023). The Systematic Assessment of the Membrane-Stabilizing and Antioxidant Activities of Several Kazakhstani Plants in the Asteraceae Family. <i>Plants</i> 13, no. 1 96. https://doi.org/10.3390/plants13010096 2. Ydyrys, A. (2023). An Overview of Medical Uses and Chemical Composition of <i>Arctium tomentosum</i> mill. <i>Engineered Science</i> , 26, 984. https://doi.org/10.30919/es984 3. Posadino, A. M., Giordo, R., Pintus, G., Mohammed, S. A., Ydyrys A., ... & Cho, W. C. (2023). Medicinal and mechanistic overview of artemisinin in the treatment of human diseases. <i>Biomedicine & Pharmacotherapy</i> , 163, 114866. DOI: 10.1016/j.biopha.2023.114866 4. Alibek, Y., Abdolla, N., Masimzhan, M., Abdrasulova, Z., & Syraiyl, S. (2023). Cultivation and resource of <i>Artemisia schrenkiana</i> (L.) for increased pharmaceutical perspective. <i>Research on Crops</i> , 24(1), 171-178. DOI : 10.31830/2348-7542.2023.ROC-881 5. Ыдырыс, А., Масимжан, М. Т., Абдолла, Н., Абдрасулова, Ж. Т., & Сырайыл, С. (2022). Қазақстанның оңтүстік шығысында өсетін эфир майлы <i>Artemisia schrenkiana</i> Ledeb өсімдігі қауымдастығының ерекшелігі. Вестник Евразийского национального университета имени ЛН Гумилева. Серия Биологические науки, 141(4), 24-36. DOI: 10.32523/2616-7034-2022-141-4-24-36 6. Syraiyl, S., Ydyrys, A., Ahmet, A., Aitbekov, R., & Imanaliyeva, M. T. (2022). Phytochemical composition and antioxidant activity of three medicinal plants from southeastern Kazakhstan. <i>International Journal of Biology and Chemistry</i> , 15(1), 73-78. https://doi.org/10.26577/ijbch.2022.v15.i1.08 . 8. Еркенова Н. Б., Сатбаева Э.М., Ә. Ыдырыс, З. Ж. Батагоева, Б. А. Абдуллаева, Н. Абдолла, С. Сырайыл <i>Artemisia Schrenkiana</i> Ledeb. Өсімдік сығындысының жалпы уыттылық жағдайын зерттеу. <u>Фармация Қазақстана 01-2022</u> . 92-96. 615.015.35 + 615.322. https://pharmkaz.kz/2022/05/19/artemisia-schrenkiana-ledeb-%D3%A9simdik-sy%D2%93yndysyny%D2%A3-zhalpy-uyttyly%D2%9B-zha%D2%93dajyn-zertteu/
Patents	-