

ANNOTATION
on the dissertation for scientific degree of PhD, in specialty 6D060700-
Biology “Analysis of the flora of the western part of the Kyrgyz Alatau”
by Take Zhailybayeva

Research topic: “Analysis of the flora of the western part of the Kyrgyz Alatau”

Purpose of the research: To study and analyze the flora of the western part of the Kyrgyz Alatau.

Research objectives:

1. Inventory of the flora of the western part of the Kyrgyz Alatau;
2. Compilation of a flora synopsis and its analysis on taxonomic, geographical, environmental, and biomorphological aspects;
3. Determination of types of habitats and identification of their geographical connections with floras of other regions;
4. Identification of endemic (local species), subendemic and rare species;
5. Analysis of the economic importance of the studied plant species.

Research methods:

1. The primary research method is the route-territorial (reconnaissance) method. There are 9 expedition routes covering the entire territory of the western part of the Kyrgyz Alatau. As a result of fieldwork, more than 1,300 herbarium sheets were collected;

2. The herbarium collection of the Institute of Botany and Phytointroduction of the National Academy of Sciences of the Republic of Kazakhstan (AA) and the herbarium collection of the Institute of Biology of the National Academy of Sciences of the Kyrgyz Republic were used;

3. The collection and processing of herbarium material were conducted according to the standard methodology of A.K. Skvortsov (1977). In the process of plant identification, the multi-volume “Flora of the USSR” (1934-1964), “Flora of Kazakhstan” (1956-1966), “Illustrated Identifier of Plants of Kazakhstan” (1962 – 1975);

4. The location of rare, endemic, and sub-endemic species was conducted according to the system of A.L. Takhtajyan (1978);

5. The writing of Latin names for species, genera, and families was based on the work of S.K. Cherepanov (1995);

6. The determination of plant life-forms was conducted according to the classifications of K. Raunkiaer (1903) and I.G. Serebryakov (1964);

7. To determine the geographical connections of the flora of the western part of the Kyrgyz Alatau with adjacent territories, a mathematical method was applied using the Ekman’s formula modified by Stugren and Radulescu;

8. The rationale for the protection of rare and endangered species was based on our materials and materials from the “Red Book of the Kazakh SSR” (1981), “Red Book of Kazakhstan” (2014), “Red Book of the Kyrgyz SSR” (1985).

The main provisions submitted for defense (scientific hypotheses and other conclusions that constitute novelty have been proven):

1. The species composition of the flora of the western part of the Kyrgyz Alatau consists of 1473 species, 504 genera, 94 families;
2. A comprehensive analysis of the studied flora was carried out: taxonomic, biomorphological, ecological, geographical;
3. Features of the taxonomic structure are that the flora is represented mostly by representatives of the Magnoliophyta department: the dominant position is occupied by the family. Asteraceae, Poaceae and Fabaceae;
4. 53 types of habitats represent the geographical structure: the types of Palearctic, mountain-Middle Asian, mountain-Middle Asian-Iranian, Holarctic types of habitats predominate.

Justification of the novelty and significance of the results obtained and their alignment with scientific development directions or state programs:

1. The species composition of the western part of the Kyrgyz Alatau and the inventory of flora were studied for the first time. A synopsis of the flora was compiled.
2. Taxonomic, ecological, and life-form analyses were conducted. Geographic elements of the studied territory were identified, and geographic connections were indicated.
3. As a result of systematic, comparative-floristic, and ecological analyses, the features and patterns in the distribution of the flora of the Kyrgyz Range were established. Geographic elements of the studied territory are separately presented.
4. The new data on the flora will be considered in the preparation of new editions of “Flora of Kazakhstan”, “Flora of Kyrgyzstan” and “Identifier of Vascular Plants of Kazakhstan”. The 46 plant species we identified as being in the most critical condition should be considered in the preparation of the third edition of the “Red Book of Plants of Kazakhstan”. The materials on the flora of the Kyrgyz Alatau Mountain mass can be useful for resource research and nature conservation activities.
5. Detailed descriptions of the geography and distribution of species can be used for the study and rational use of raw plant resources, for further selection of flora species, as well as for conservation as a gene pool necessary for the development of nature conservation activities.

Description of the doctoral student’s contribution to the preparation of each publication (the dissertation author’s share is indicated as a percentage of the total text):

The main results of the dissertation research were published in 10 publications, including: 2 articles in international scientific journals included in the Scopus scientometric database (percentile 59, Q2 and percentile 42, Q3)

1. Systematic Analysis of the Flora of the Western Part of the Kyrgyz Alatau. International Journal on Advanced Science, Engineering and Information Technology. *Vol.13* (2023) No. 5 ISSN: 2088-5334. DOI: <http://dx.doi.org/10.18517/ijaseit.13.5.18012> (Co-authors are K.I. Shalabayev, B.R. Tasbolatova, Sh. Shapalov, G. Berkinbayeva, doctoral student's contribution: 70%)
2. Flora of the gorges Merke, Sandyk, Shaisandyk in the western part of Kyrgyz Alatau, a natural border between Kyrgyzstan and Kazakhstan. Caspian Journal of

Environmental Sciences, Vol. 22 No. 1 pp. 59-69 Received: July 04, 2023 Revised: Oct. 26, 2023 Accepted: Dec. 17, 2023.
DOI:<http://dx.doi.org/10.22124/CJES.2024.7497> (Co-authors are K.I. Shalabayev, A.D. Maimatayeva, B.K. Mombayeva, R.N. Atraubayeva, A. Beketova, doctoral student's contribution: 65%)

1 article was published in publications recommended by the Science and Higher Education Quality Assurance Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan:

1. Chemical composition of useful plants growing in the western part of Kyrgyz Alatau. ISSN 2305-9397. The scientific and practical journal "Science and Education" of the West Kazakhstan Agrarian and Technical University named after Zhangir Khan. 2023. No. 4–2 (73) (Co-author is K.I. Shalabayev, doctoral student's contribution: 80%)

Abstracts of 6 reports were published at an international scientific and practical conference organized in the Republic of Kazakhstan:

1. Analysis of hardy-shrub flora of the western part of the Kyrgyz Alatau. II International Scientific and Practical Conference "Ecology and Conservation of Biodiversity" (October 23-24, 2019), pp. 44-47, Almaty. (Co-author is K.I. Shalabayev, doctoral student's contribution: 80%)

2. Useful plants of hardy-shrub flora found in the Kyrgyz Alatau range. V International Scientific and Practical Conference "Science and Education in the Modern World: Challenges of the 21st Century" (December 10-12 2019) pp. 145-148, Nur-Sultan. (Co-author is K.I. Shalabayev, doctoral student's contribution: 80%)

3. To the study of the flora of the Kyrgyz Alatau range. International scientific and practical conference "Modern trends in pedagogical education", dedicated to the 125th anniversary of T. Ryskulov (December 20, 2019) pp. 115-118, Taraz., (Co-author is K.I. Shalabayev, doctoral student's contribution: 80%)

4. Plant cover of the western part of the Kyrgyz Alatau. (International scientific conference of young scientists "Study and conservation of flora and fauna" (Kazakh National Pedagogical University and Tashkent State Pedagogical University named after Nizami) 2023, pp. 61-67. (Co-authors are K.I. Shalabayev, D.M. Amanbekova, doctoral student's contribution: 70%)

5. Analysis of poisonous plants of the Kyrgyz Alatau (Araltobe, Sandyk, Shaysandyk). International scientific conference of young scientists "Study, conservation and rational use of biological diversity of Central Asia" (Kazakh National Pedagogical University and Tashkent State Pedagogical University named after Nizami) 2024 pp. 30-35. (Co-author is E.K. Kozhabek, doctoral student's contribution: 80%)

6. Poisonous plants of pastures of the western part of Kyrgyz Alatau. V International Scientific, Educational and Methodological Conference "Paradigm of Continuous Development of the Kazakhstani Education System for Sustainable Development: Experience and Perspectives". Almaty, 2024 (KazNU), pp. 265-271. (Co-authors are S.K. Imankulova, K.I. Shalabayev, D.M. Amanbekova, doctoral student's contribution: 70%)

Materials of the international scientific and practical conference organized in distant and near foreign countries:

1. Poisonous plants of the western part of the Kyrgyz Alatau. International scientific and practical conference. MODERN KNOWLEDGE: RESEARCH AND DISCOVERY. Canada, December 19-20, 2023, pp. 194-210. (Co-author is K.I. Shalabayev, doctoral student's contribution: 80%).