Xinjiang Institute of Ecology and Geography,
Chinese Academy of Sciences

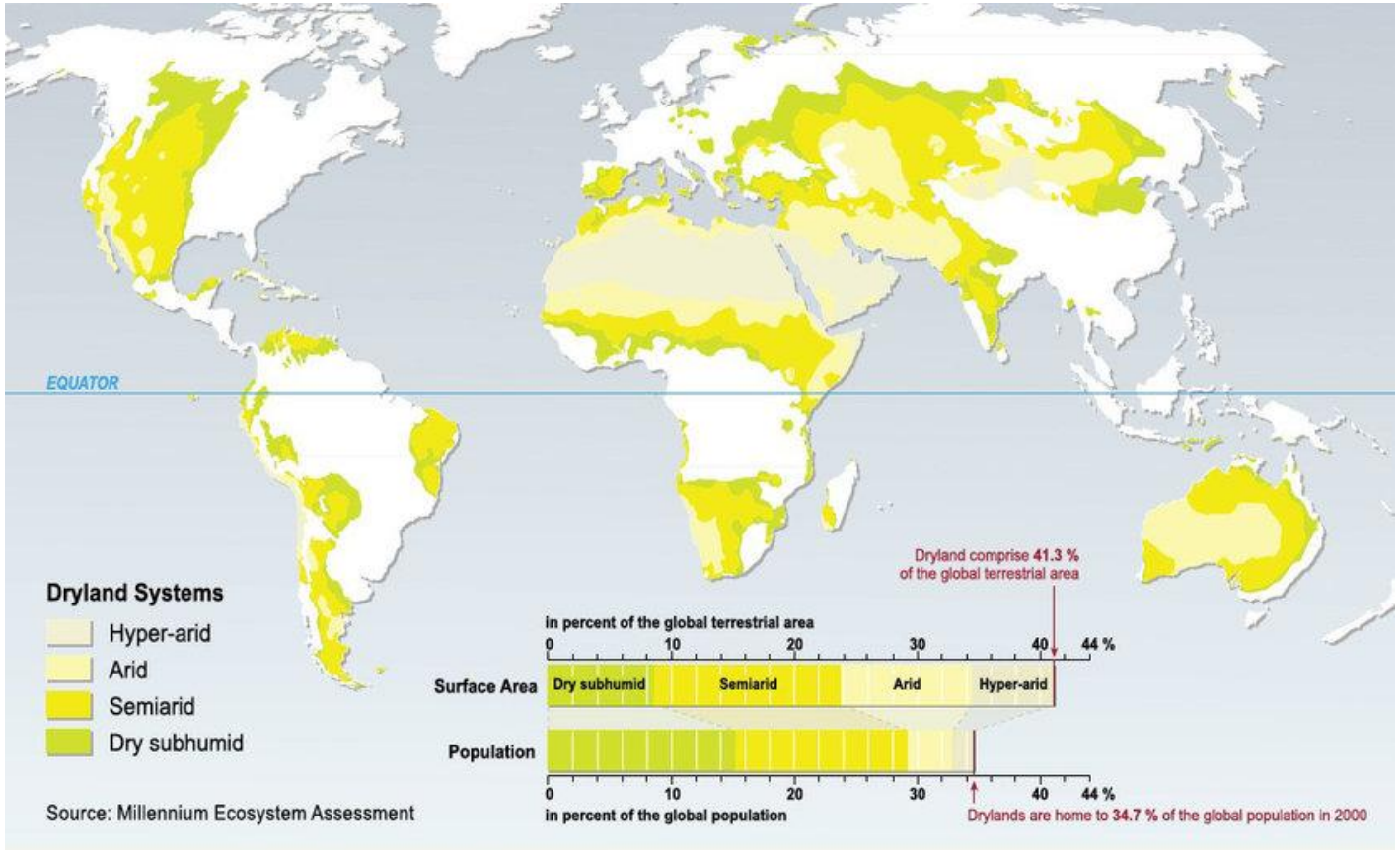
2026
Harbin, China
Aug. 30-Sep. 1
The 4th International Symposium of Mapping Asia Plants
第四届亚洲植物多样性编目国际研讨会

The plant diversity information sharing platform in Central Asia

LI Wenjun



Biodiversity in arid lands are worthy of more concerns









Arid lands make up ~ 1/3 of the Earth's terrestrial surface and are home to 34.7% of the world's population.

- Fragile Ecosystem
- Scarce Vegetation
- Unique bioresources
- Rich endemic biological diversity
- Especially most vulnerable to climate change and anthropogenic activities

Integrating biodiversity conservation in the management of arid land ecosystem is an important measure to achieve the 2050 Vision of Living harmony with nature.

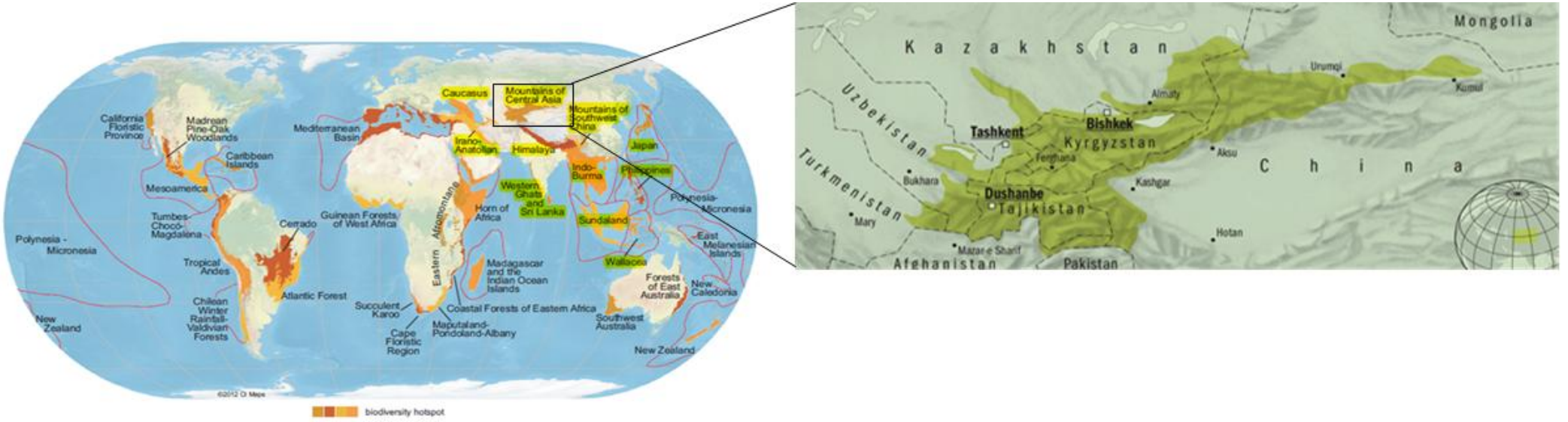
Central Asia, a special and unique area, both biologically and geographically

- Unique biogeographic units
- Key area of global biodiversity
- Abundant types of biological resources
- Origin and differentiation center of many species



The global biodiversity hotspot: Mountains of Central Asia

- 7000 vascular species in the mountainous area, accounting for over 75% in the region,
- Enriching of endemic species, fruits and nuts, wild crop relatives



Main threats and challenges

- Rapid population growth and expansion of farmland and urban areas
- Unsustainable use of natural resources such as overexploitation of biological resources and excessive hunting and fishing
- Habitat fragmentation and the loss
- Global climate change and extreme weather events
- Alien species invasions
- **Lack of information sharing on biodiversity data**



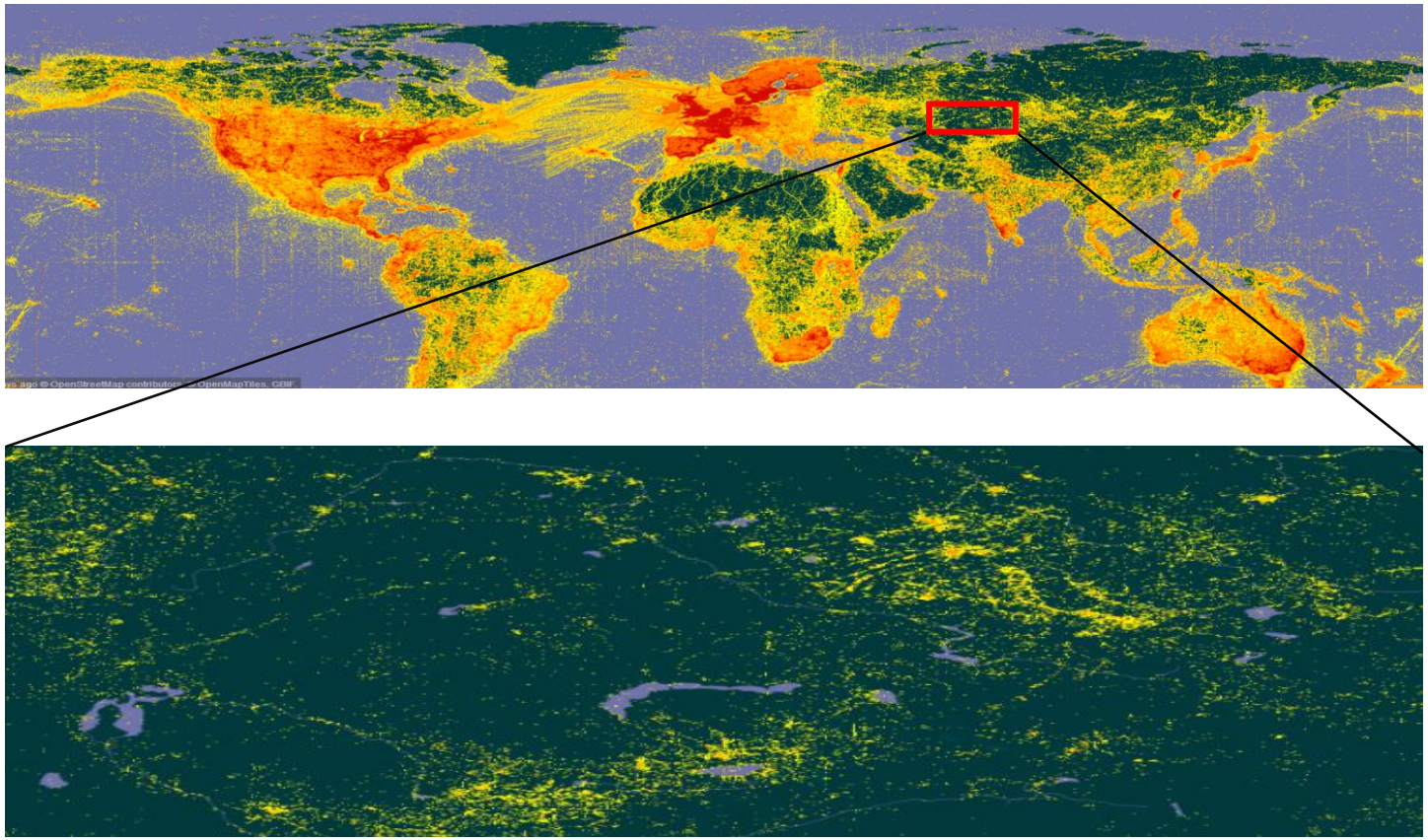







Main threats and challenges

Information sharing on biodiversity in arid Central Asia is shockingly inadequate



GBIF
Occurrence records
2,976,807,312

Data from CA
1,015,919

0.03%

the preliminary work, a solid foundation for botanical research in Central Asia

- Lots of investigation in Arid Central Asia since 19th century
- Near 3 million specimens stored in the herbaria in Central Asia
- All the preliminary work and data, i.e. explorations and floristic data, flora books, monographs, papers and specimens, constitutes a solid foundation for botanical research in Central Asia

Country & region	Flora & Checklist & Red Data book	Species Count	Reference
Central Asia	Conspectus florae Asiae Mediae, 1-11	9341	Kovalevskaya, 1968–1971, Bondarenko and Nabiev, 1972, Pakhomova, 1974–1976, Kamelin et al., 1981, Adylov, 1983, 1987; Nabiev, 1986, Adylov and Zuckerwanik, 1993; Khassanov, 2015
	Plant resources and utilization in Central Asia	9346	Zhang et al., 2013
	Checklist of vascular plants of Central Asia	9520	Li et al., Unpublished
Kazakhstan	Flora Kazakhstana, 1-9	5631	Pavlov, 1956-1966
	Checklist of vascular plants of Kazakhstan	5658	Abdulina, 1999
	Red Data Book of Kazakhstan,Volume 2: Plant	387	Baitulin, 2014
Kyrgyzstan	Flora Kirgizskoj SSR, 1-11, supplementary 1-2	3576	Shishkin and Vvedensky, 1950–1962
	Checklist of vascular plants of Kyrgyzstan	3927	Lazkov and Sultanova, 2014
	The Red Book of the Kyrgyz Republic	87	Shukurov, 2006
Tajikistan	Flora Tadzikskoj SSR, 1-10	4445	Ovchinnikov, 1957–1991
	The Red Data Book of the Republic of Tajikistan, Volume 1	267	Rahimi et al., 2017
Turkmenistan	Flora Turkmenii, 1-7	2607	Fedtschenko et al., 1932–1960
	Manual of vascular plants of Turkmenistan	2800	Nikitin and Geldykhanov, 1988
	The Red Data Book of Turkmenistan Volume 1: Plants and Fungi Ed. 3rd	115	Annabayramov, 2011
Uzbekistan	Flora Uzbekistanica, 1-6	4148	Schreder and Vvedenskyi, 1941–1962
	Flora of Uzbekistan, 1-3	375	Sennikov et al., 2016–2019
	Red Data Book of Uzbekistan 1. Plants.	324	Khassanov and Pratov, 2009
Xinjiang, China	Flora Xinjiangensis, 1-6	3875	Florae Xinjiangensis, 1992–2011





Country	Herbarium Code	Institution	Location	specimens
Kazakhstan	AA	The Institute of Botany and Phytointroduction, Ministry of Science, Academy of Sciences	Alma-Ata, Kazakhstan	300,000
	PPIU	M. Utemisov Western Kazakhstanian State University	Uralsk, Kazakhstan	340,000
	KG	International Phytochemistry Research and Production Institute	Alma-Ata, Kazakhstan	28,000
	KSPI	Kostanay State Pedagogical Institute	Kostanay, Kazakhstan	25,000
Kyrgyzstan	FRU	Institute for Biology and Soil, National Academy of Science, Kyrgyzstan	Bishkek, Kyrgyzstan	400,000
Tajikistan	TAD	Institute of Botany, Plant Physiology and Genetics, Academy of Sciences, Republic of Tajikistan	Dushanbe, Tajikistan	200,000
	KHOR	Pamir Biological Institute	Khorog, Tajikistan	30,000
Turkmenistan	ASH	National Institute of Deserts, Flora and Fauna of the Ministry of Nature Protection of Turkmenistan	Ashkhabad, Turkmenistan	135,000
Uzbekistan	TASH	Institute of Botany, Academy of Science, Uzbekistan	Tashkent, Uzbekistan	1,500,000



November, 2017, Urumqi



December, 2020, Urumqi

Global Ecology and Conservation 24 (2020) e01220

Contents lists available at ScienceDirect

Global Ecology and Conservation

journal homepage: http://www.elsevier.com/locate/gecco

Review Paper

Mapping Asia Plants: Current status of floristic information for Central Asian flora

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[d] Institute of Botany, Plant Physiology and Genetics, Academy Sciences, Republic of Tajikistan, No.27 Karamova Street, Dushanbe, 734017, Tajikistan
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ARTICLE INFO

Article history:
Received 20 May 2020
Received in revised form 5 August 2020
Accepted 5 August 2020

Keywords:
Central Asia
Flora
Checklist
Herbaria
Biodiversity
Mapping Asia plants

ABSTRACT

Central Asia, which is composed of five countries – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, is an important global biodiversity hotspot, but a botanically poorly-known part of Asia. As part of the Mapping Asia Plants (MAP) project, we reviewed the history of botanical investigations, floristic works and publications in this region, as well as key floras, checklists, herbaria and online databases in Central Asia. The published Floras and Checklists dating back to 1851 lay a solid foundation for botanical research in Central Asia today. Eight Floras (61 vol) and four Cheklists for this region were listed and introduced in this paper. At the regional level, the full eleven volumes *Conspectus Florae Asiae Mediae*, containing 9341 species of vascular plants belonging to 1245 genera and 161 families across Central Asia, were published during 1968–2015. At the country level, the national Floras of five countries which were published during 1932–1991, listed 5631, 3576, 4445, 2607 and 4148 species of vascular plants in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, respectively. The species counts were updated to 5658, 3927 and 2800 in the national Checklists of vascular plant in Kazakhstan (1999), Kyrgyzstan (2014) and Turkmenistan (1988), respectively. We also simply introduced the key herbaria in this region which contain about 2.5 million specimens in total. However, some major gaps and limitations, i.e. the outdate publications, national Floras mainly in local language, the massive non-digitized specimens, and the lack of an online database or platform, should be addressed in terms of their global applications.

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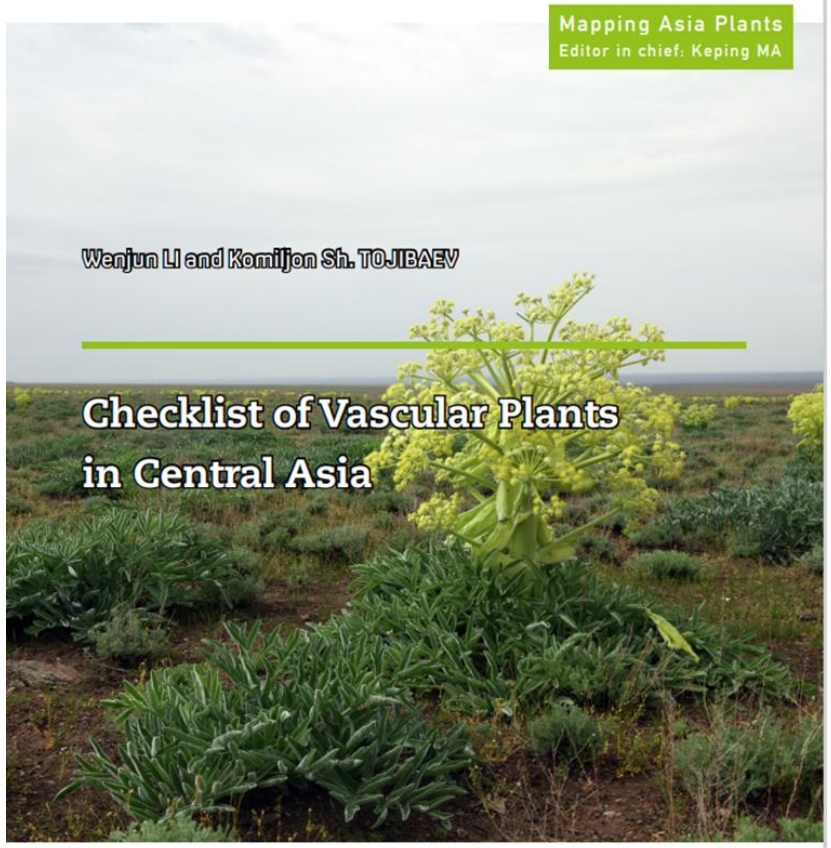
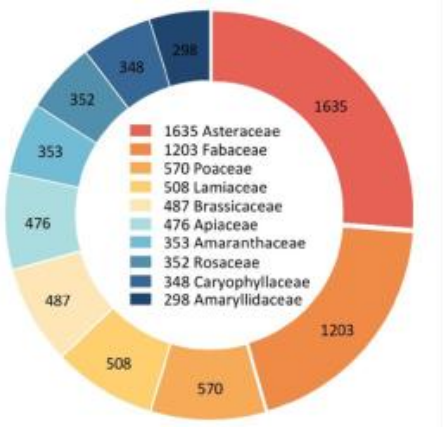
Mapping Asia Plants - Central Asia

1. Plant checklists;
2. Digitized specimens and living plant photos;
3. Digitized literatures;
4. Plant distribution database;
5. Plant trait database;
6. DNA barcoding and genomics database;
7. Vegetation plot database;
8. Protected area database;
9. Human disturbance database;
10. Major institutions and scientists.

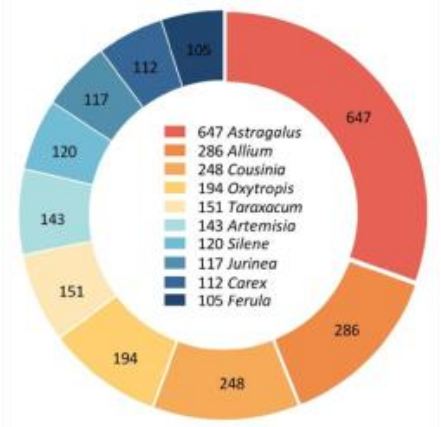
The Checklist of Vascular plants in Central Asia



	Families	Genera	Species and infraspecific taxa
Lycophytes	2	3	6
Ferns	14	25	64
Gymnosperm	3	6	36
Angiosperms	120	1164	9537
Total	**139**	**1198**	**9643**



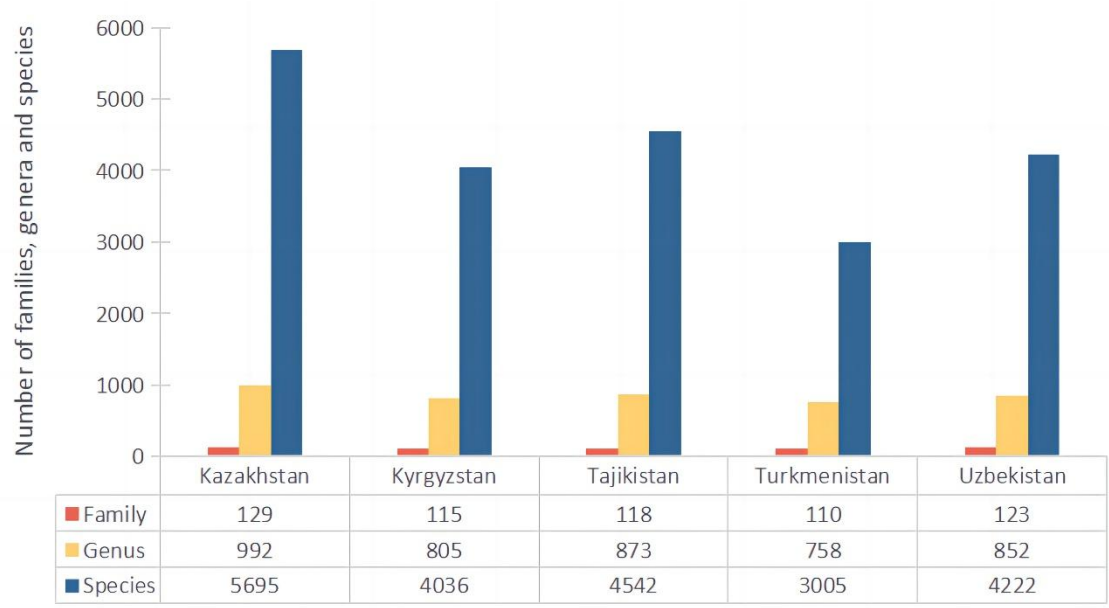
(6130 species，64.61%)



(2123 species，22.02%)

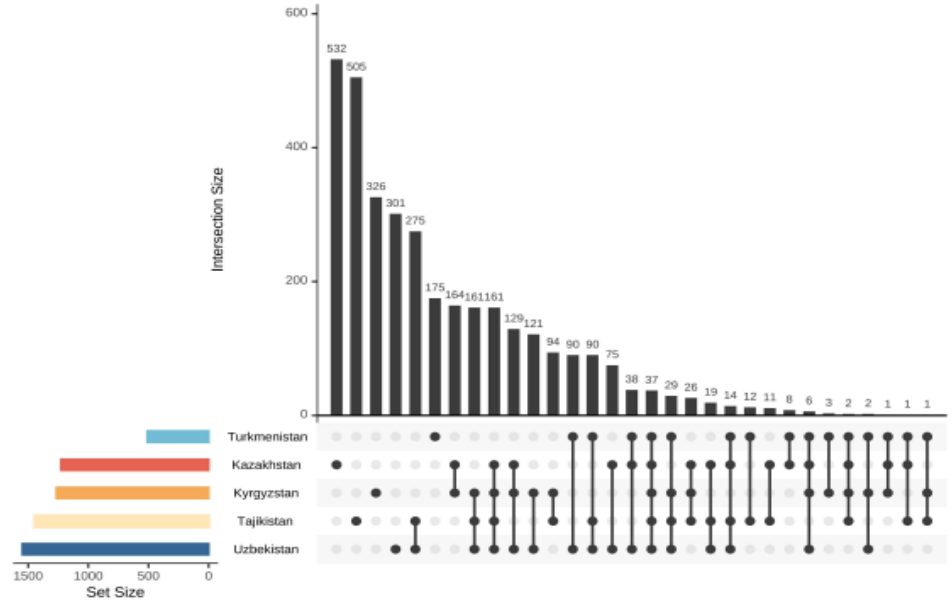
The top 10 dominant families and genera in the native vascular flora of Central Asia

The Checklist of Vascular plants in Central Asia

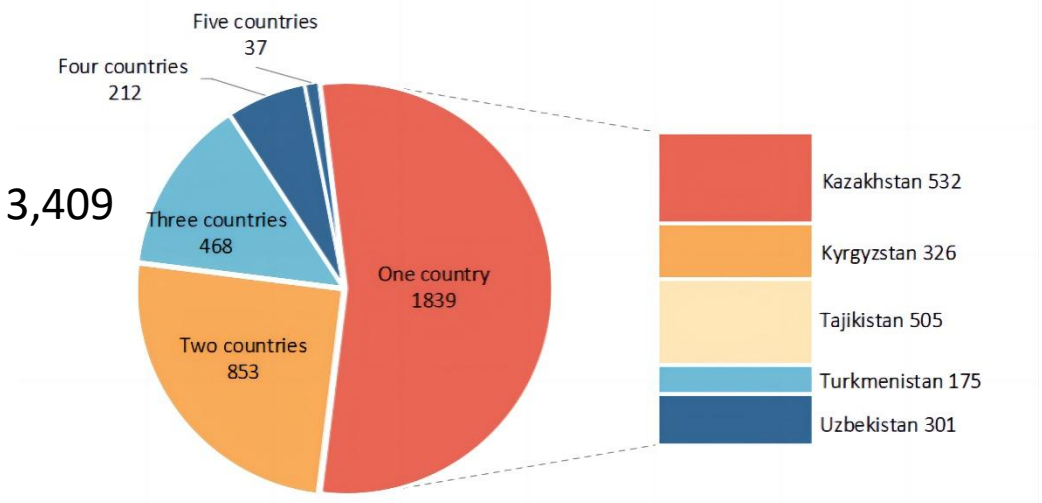


	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Family	129	115	118	110	123
Genus	992	805	873	758	852
Species	5695	4036	4542	3005	4222

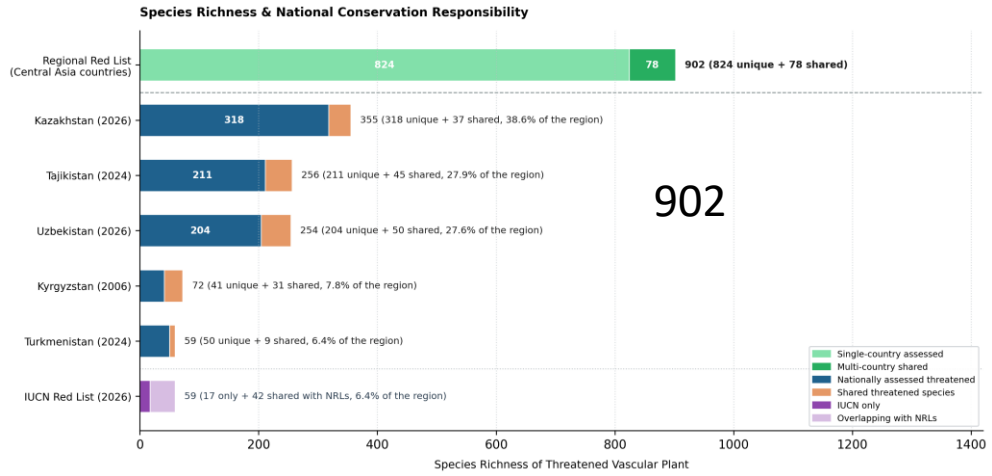
Number of families, genera and species for five countries



Similarity and local endemism analysis of all taxa in CA countries



The endemic taxa in Central Asia from one country to five countries



The threatened taxa in Central Asia



Training Workshop on Specimens Digitalization in Central Asia

(China, Uzbeikistan, Kazakhstan, Tajikistan and Kyrgyzstan)

August, 2023, Tashkent

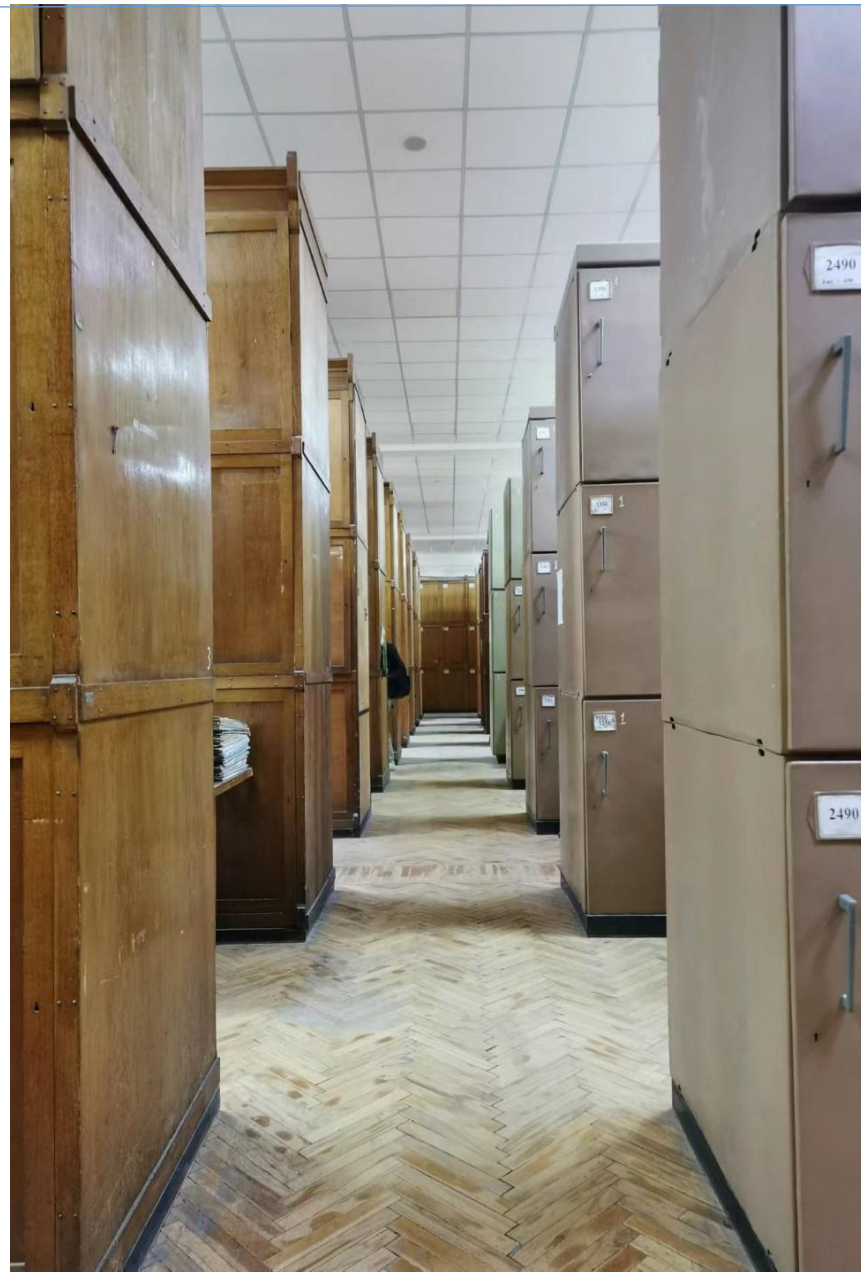
Specimen digitization











Specimen digitization

新疆
中药民族
药研究所







Specimen digitization

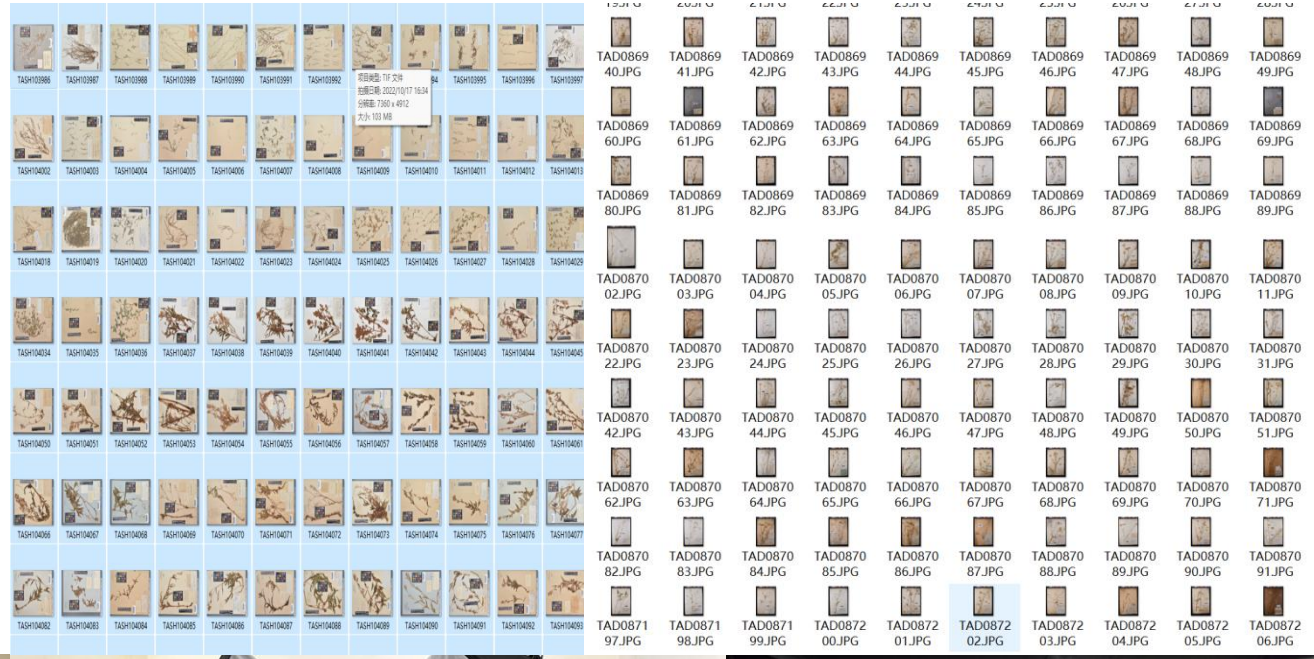
1,375,200 specimens' photos

623,600 form herbaria in Xinjiang

525,400 from Central Asia, TASH, TAD and AA

226,200 from West Asia

Kyrgyzstan



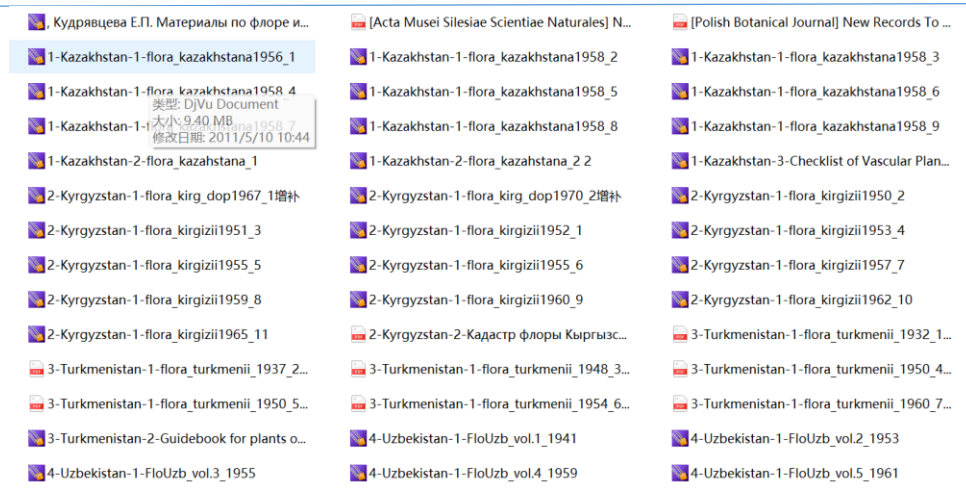








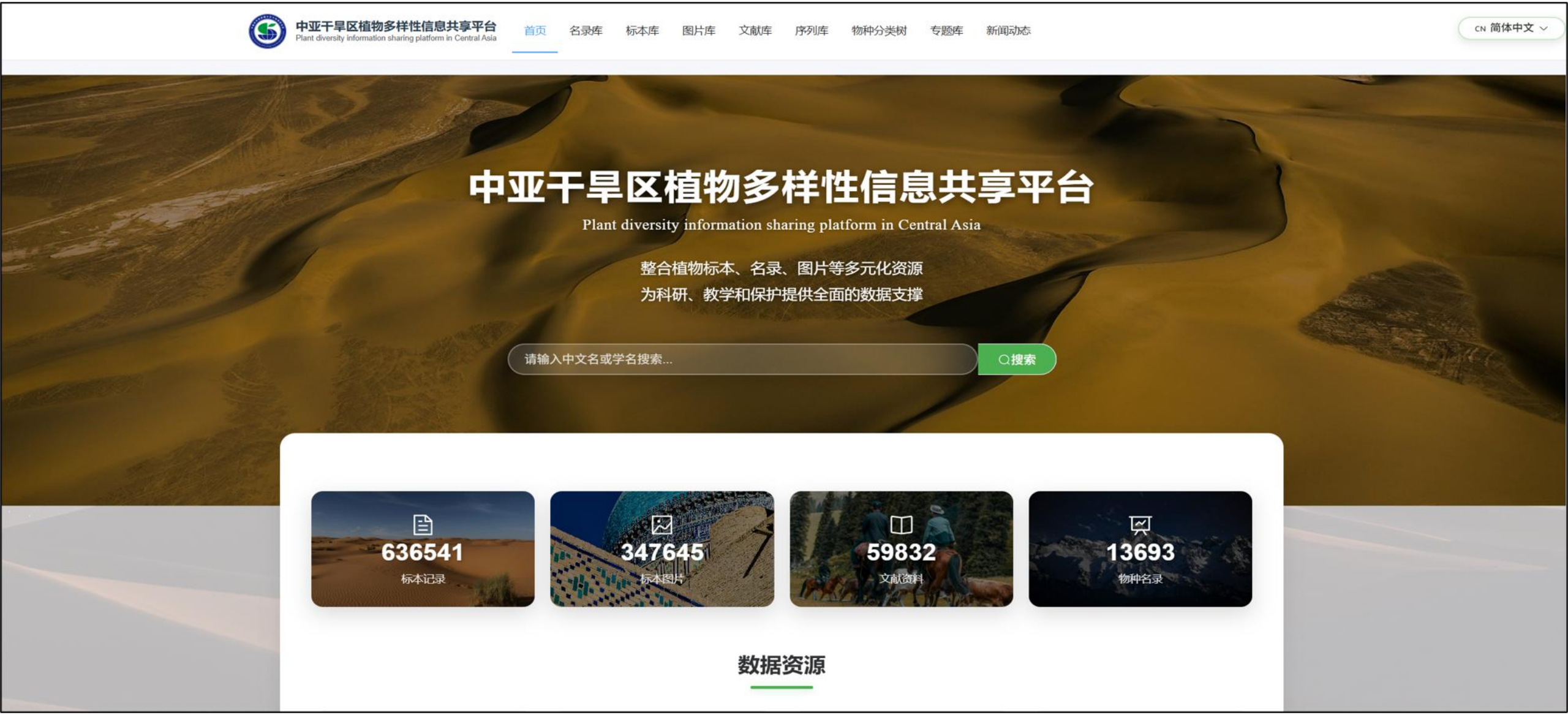
Literatures, institution and experts



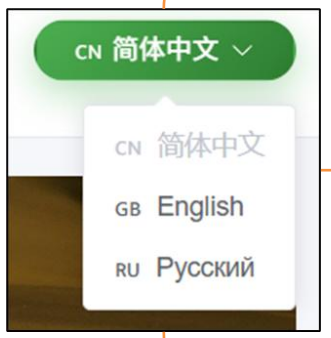
Name	Country	Institution	Genus List
Amirova, Aigul	Kazakhstan	Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, al-Farabi Av. 71, Almaty 050040, Kazakhstan	Paulownia;
Dossymbetova, Symbat	Kazakhstan	Department of Food Technology, Almaty Technological University, Tole be 100, Almaty 050008, Kazakhstan	Paulownia;
Rysbayeva, Yeldana	Kazakhstan	Department of Food Technology, Almaty Technological University, Tole be 100, Almaty 050008, Kazakhstan	Paulownia;
Usenbekov, Bakdaulet	Kazakhstan	Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, al-Farabi Av. 71, Almaty 050040, Kazakhstan	Paulownia;
Tolegen, Arman	Kazakhstan	Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, al-Farabi Av. 71, Almaty 050040, Kazakhstan	Paulownia;
Ydyrys, Alibek	Kazakhstan	Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, al-Farabi Av. 71, Almaty 050040, Kazakhstan	Paulownia;



Plant Diversity Information Platform in Central Asia

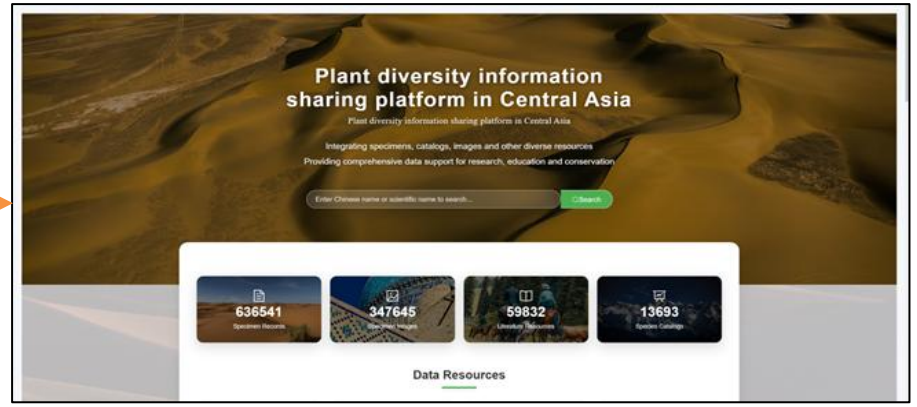


Plant Diversity Information Platform in Central Asia

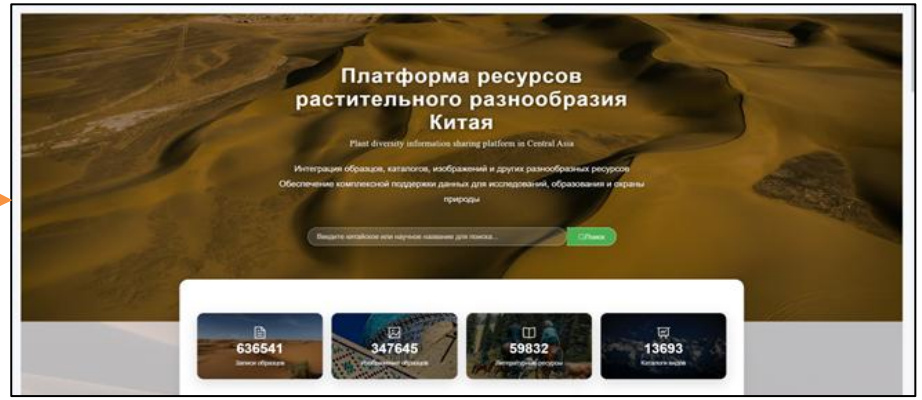




Chinese

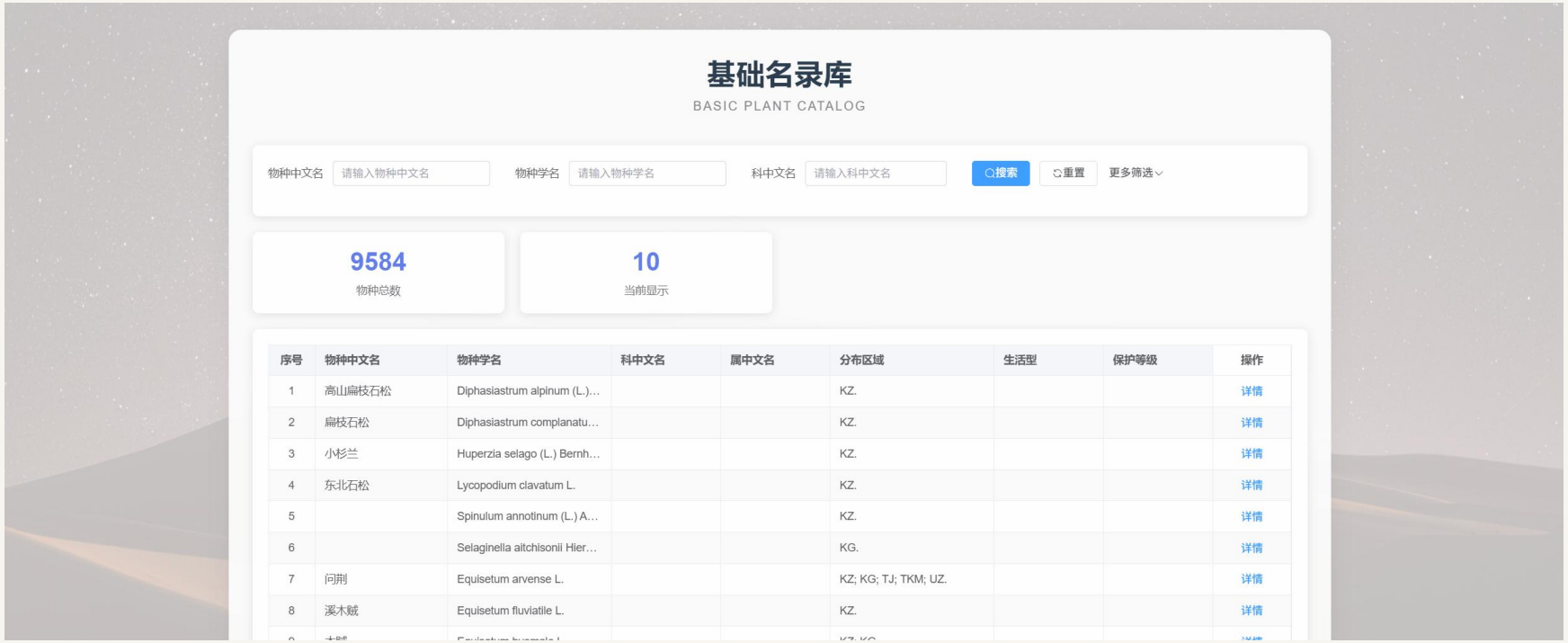


English



Russian

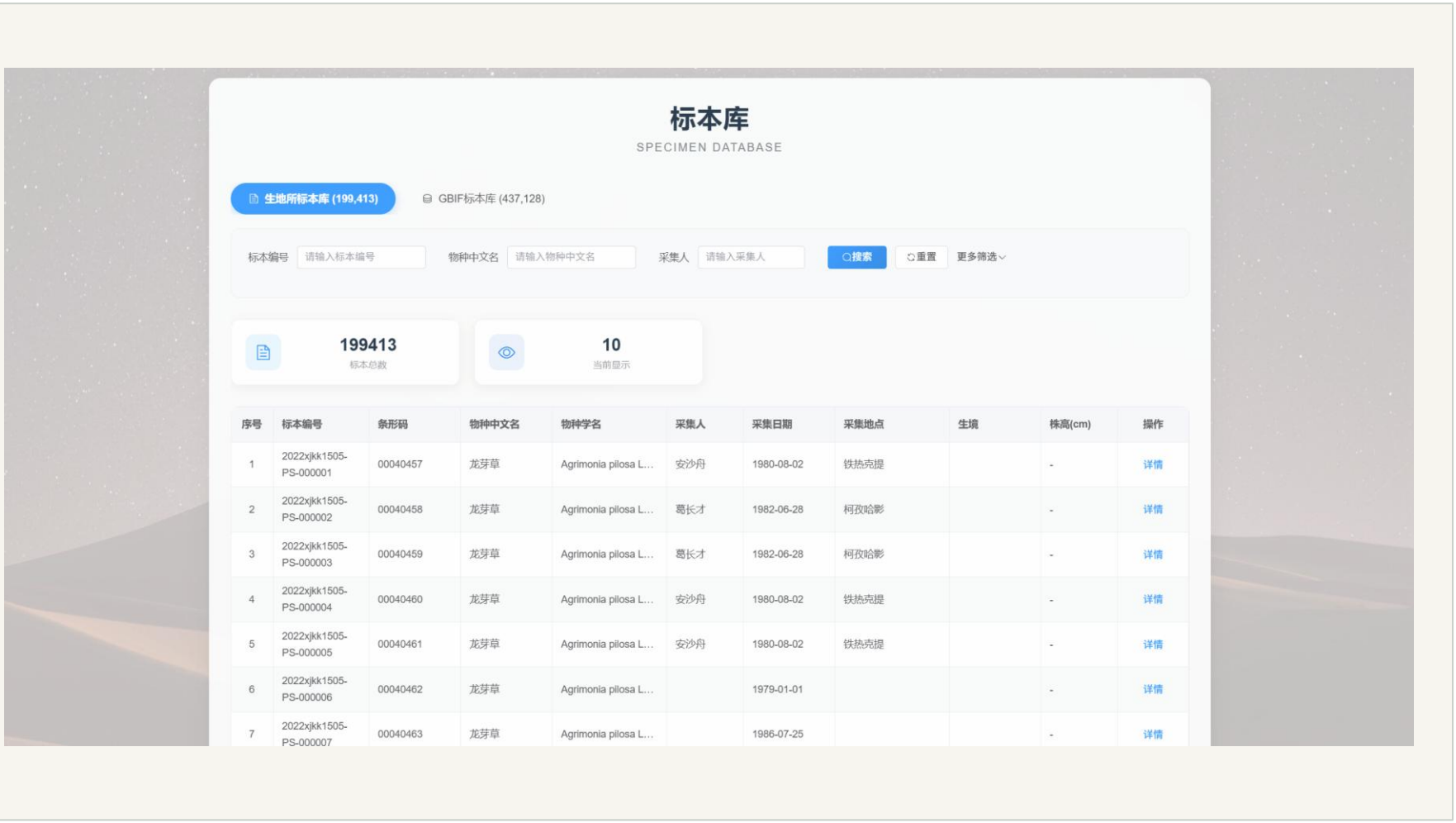
Catalogue views, from the general checklist to conservation-specific lists.



- Basic checklist of 9,643 taxa from CA and 4,109 Xinjiang

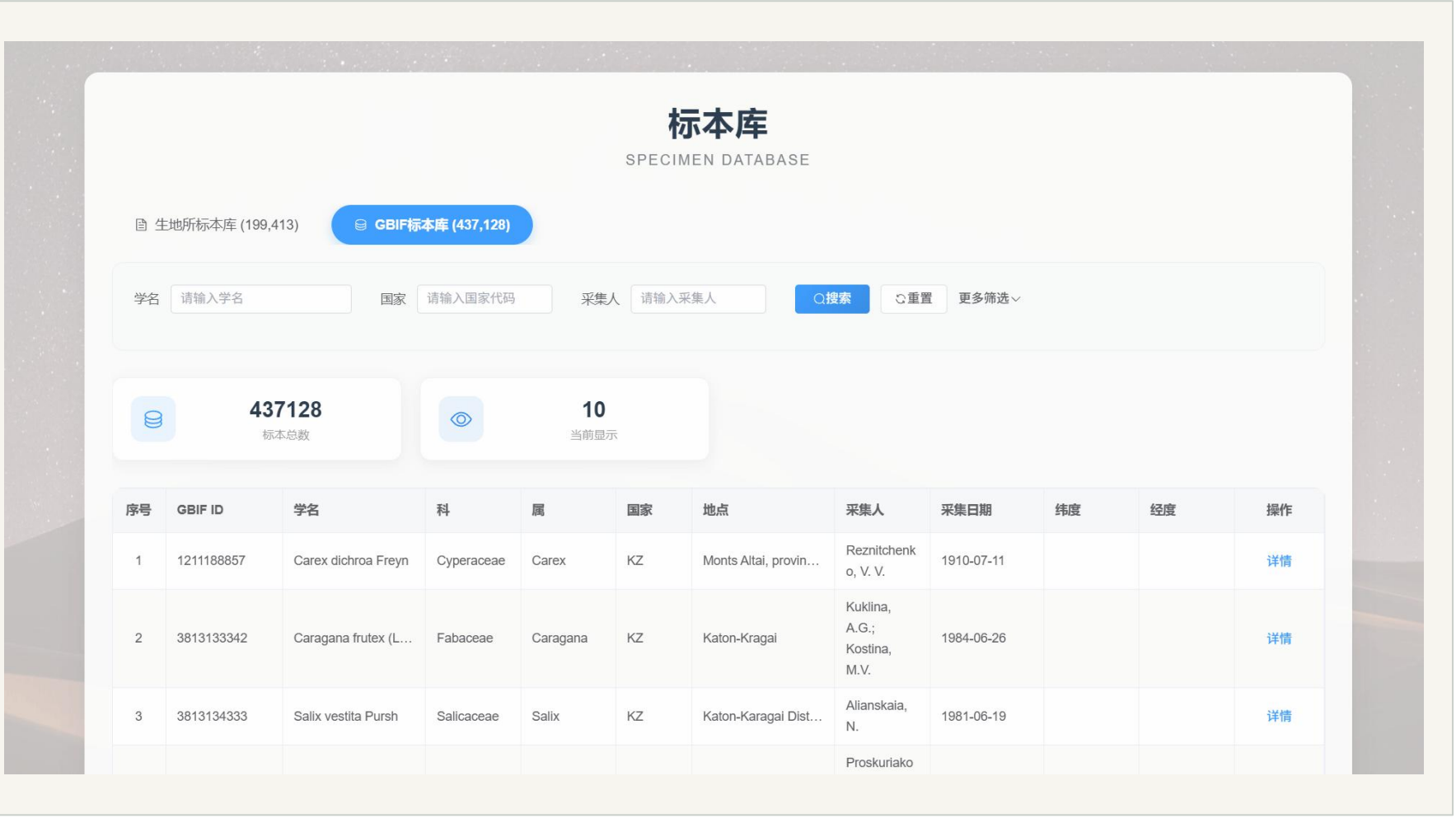
- Some basic information for each species

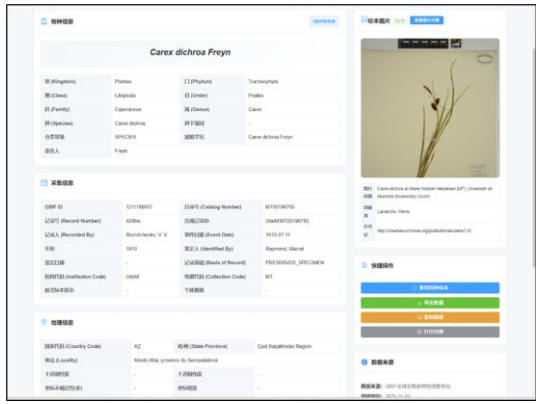
Paginated, filterable access to every specimen records with detail pages per voucher.

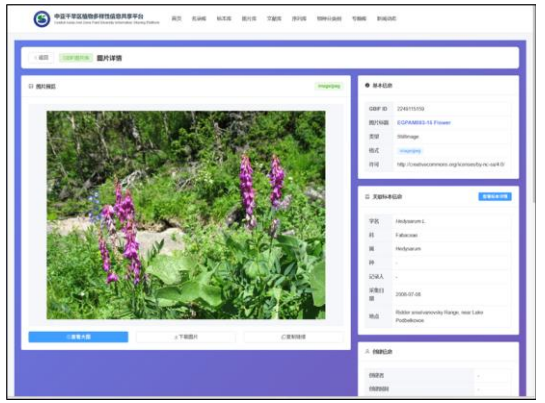


- Filter by family, genus, collector, locality and collection date

Paginated, filterable access to every specimen records with detail pages per voucher.

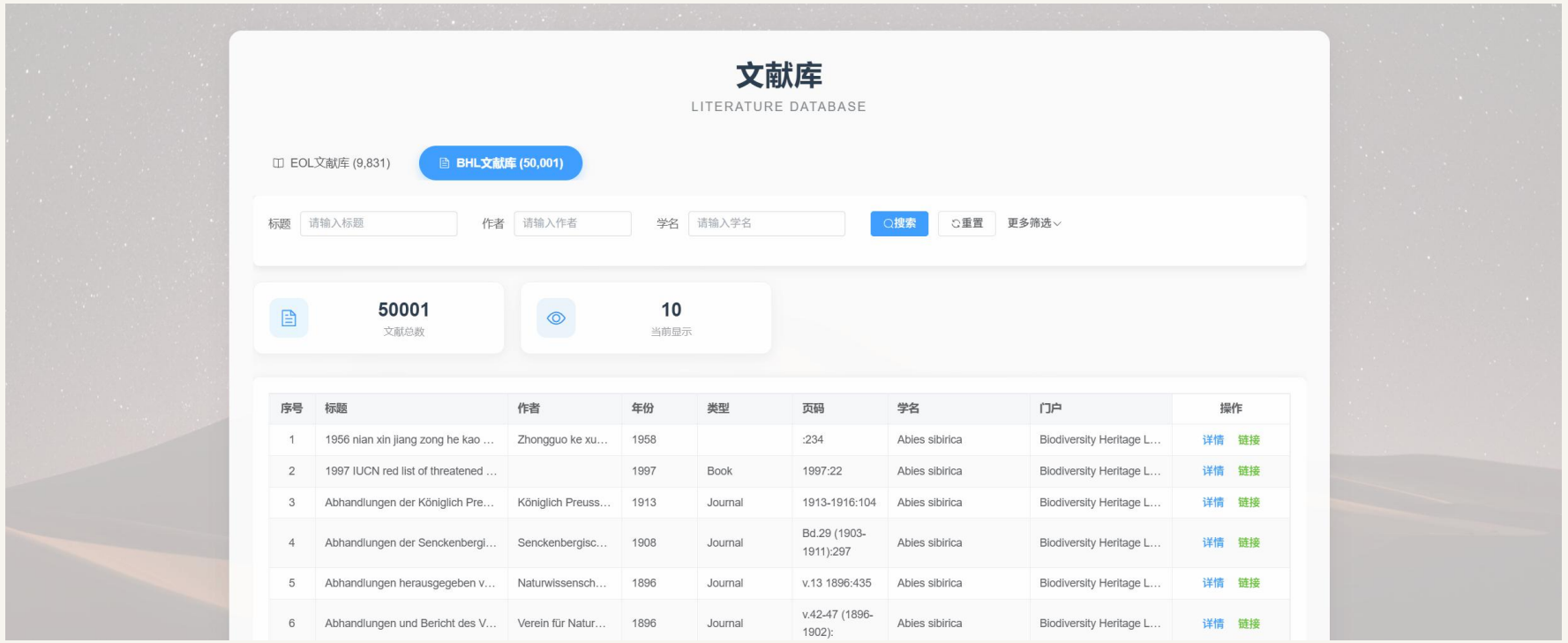






- Detail view links vouchers to images, literature and sequences

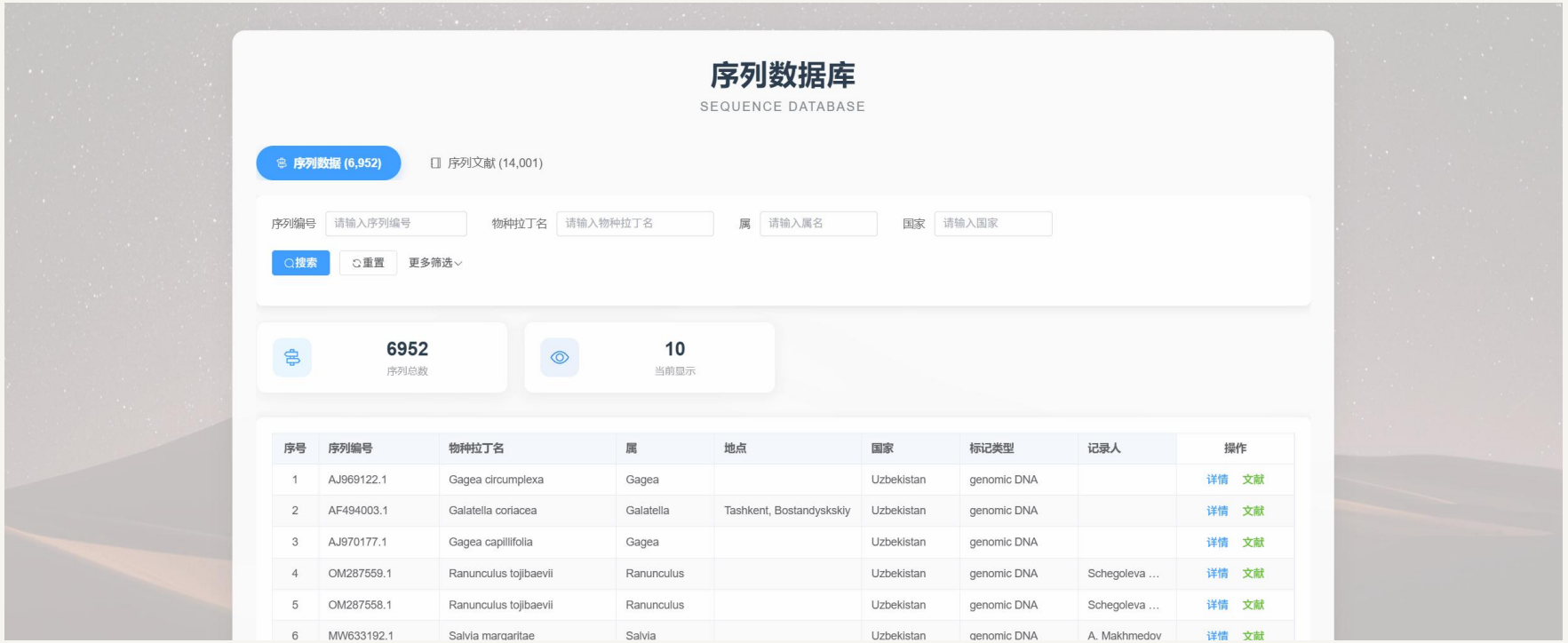
Bibliographic and molecular modules complete the evidence chain for each taxon.



- **Literature integration designed against EOL and BHL**
- Sequence information link to Genbank

Both modules are deployed and ready for content loading

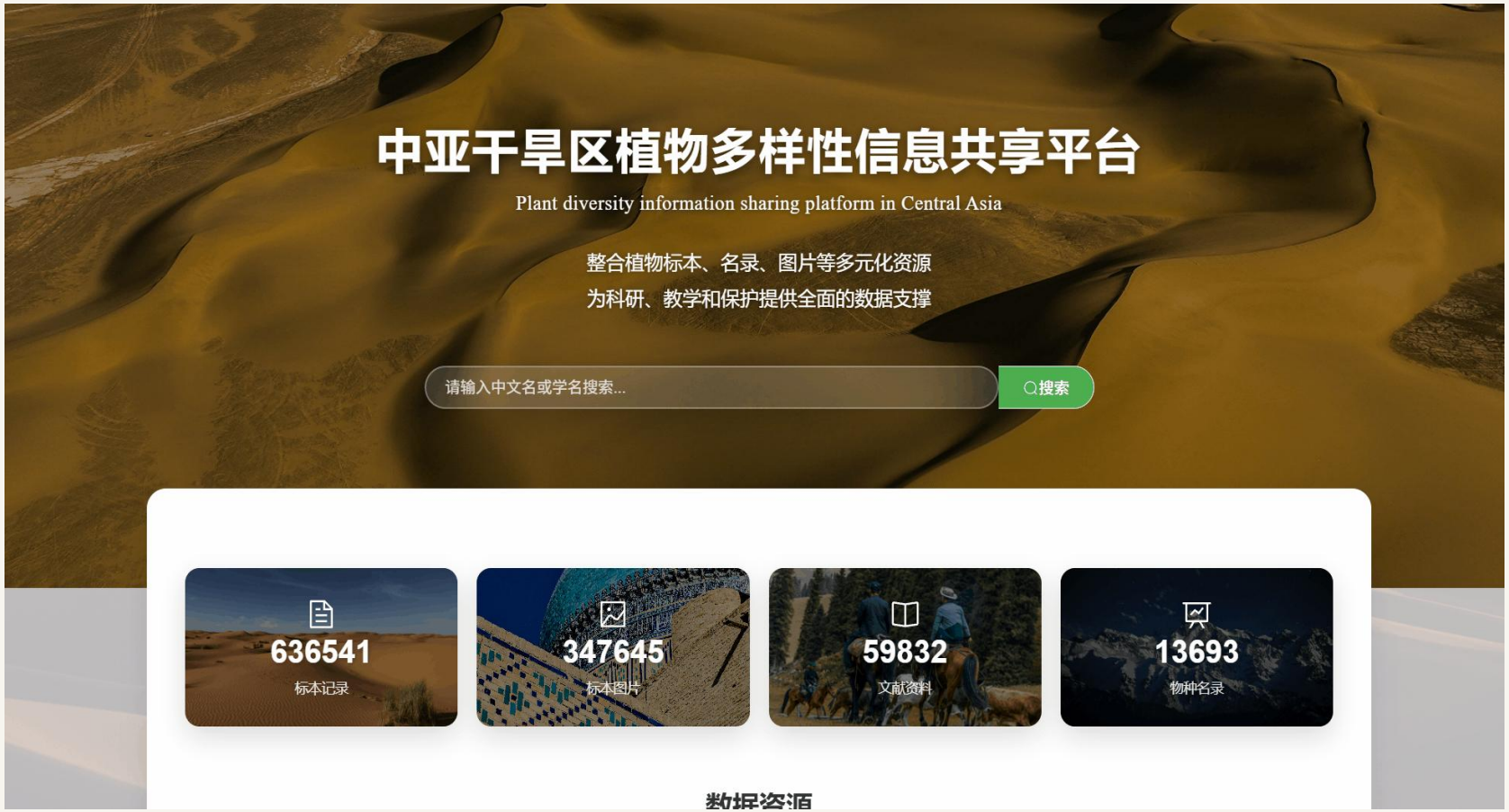
Bibliographic and molecular modules complete the evidence chain for each taxon.



- Literature integration designed against EOL and BHL
- **Sequence reference link to Genbank**

Plant Diversity Information Platform in Central Asia

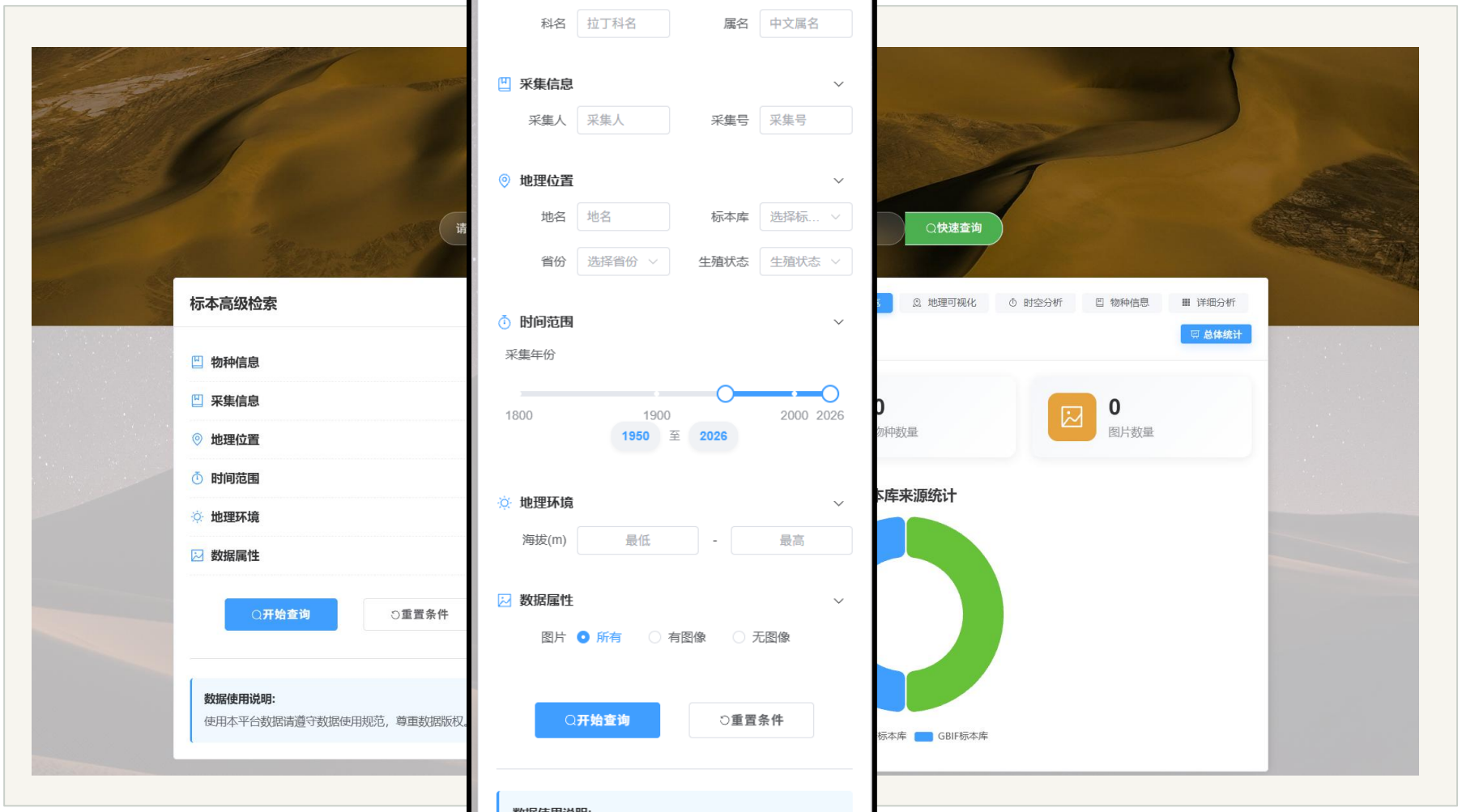
A search hub plus an advanced builder for multi-condition queries.



- **Single-box search across specimens, taxa and experts**
- Advanced form combines taxonomic, geographic and temporal filters
- Results carry straight through to maps and analytics

Plant Diversity Information Platform in Central Asia

A search hub plus an ac… condition queries.



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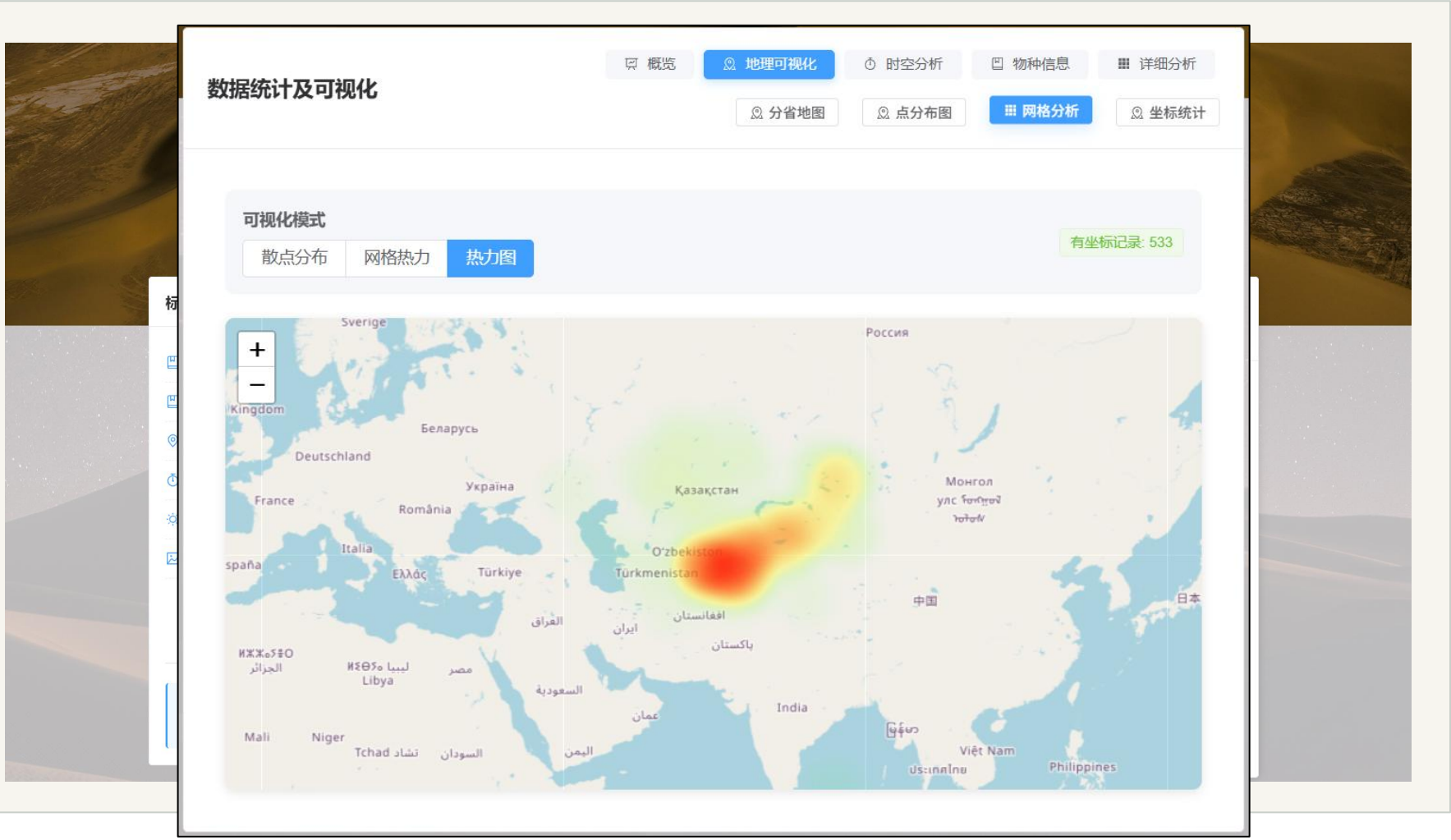

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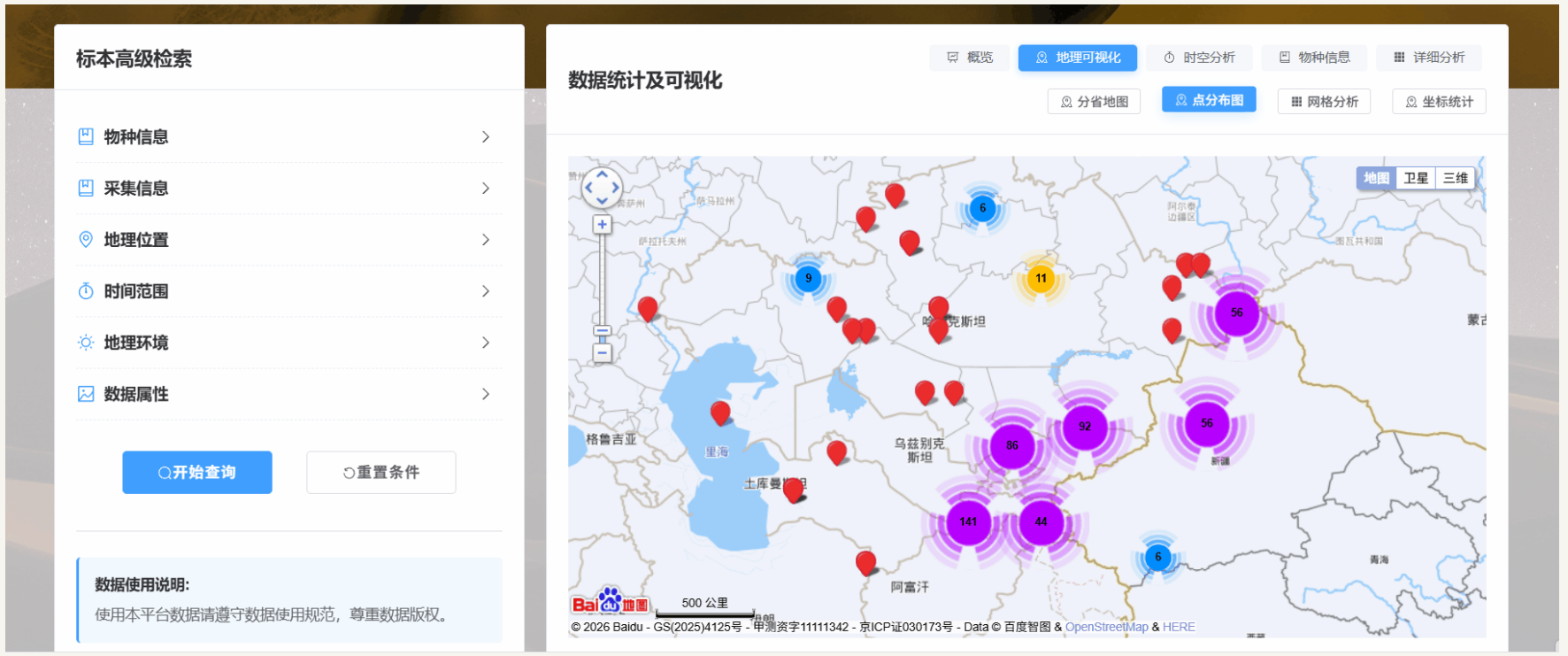
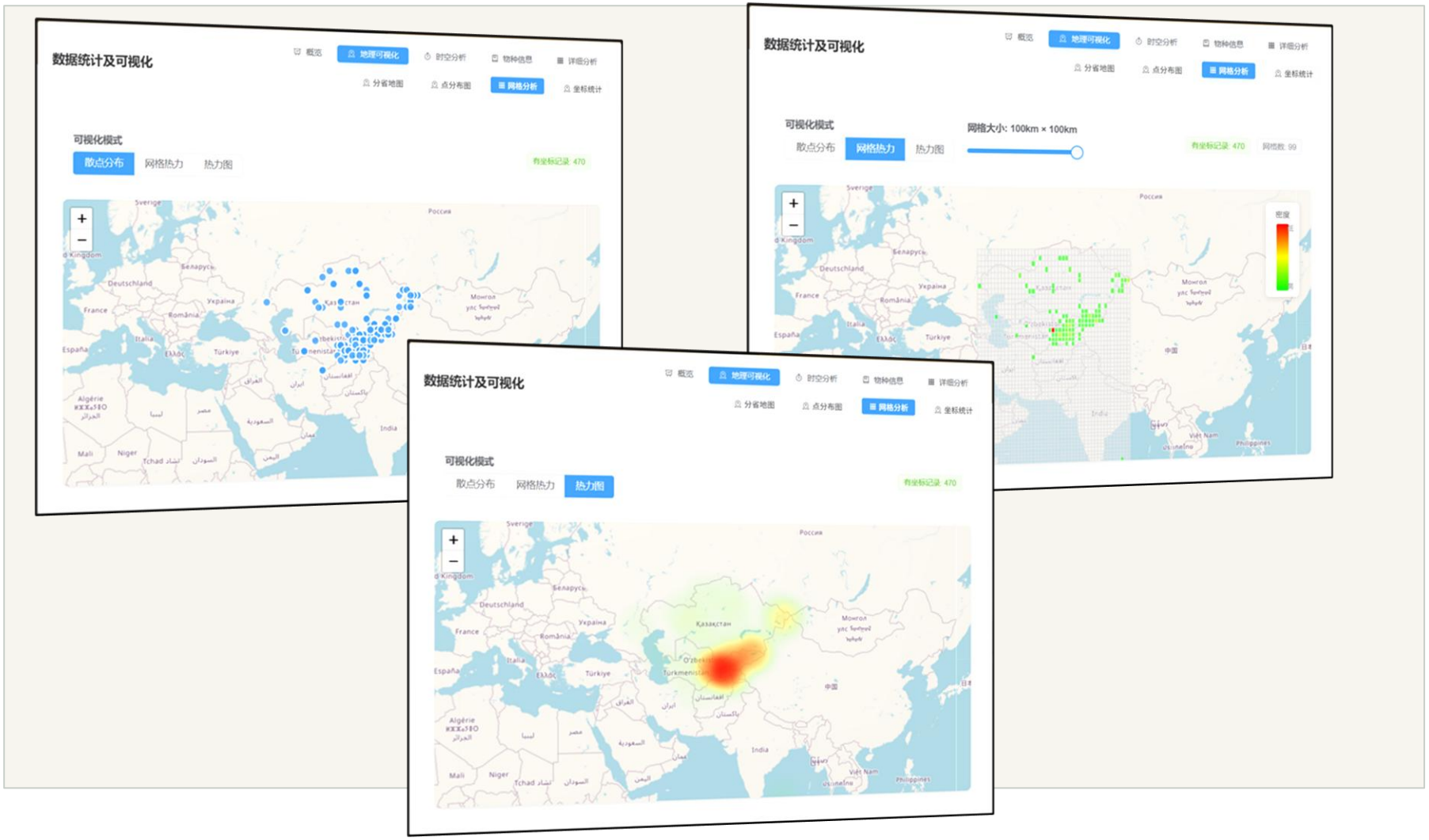
Diverse Spatial Visualization Solutions Powered by Baidu Maps and Leaflet.



- **The dual-engine architecture guarantees smooth rendering and high accuracy.**
- Offers a variety of grid analysis modes.
- Provides a feature for dynamically visualizing the spatiotemporal change of plant specimen collection.

Diverse Spatial Visualization Solutions Powered by Baidu Maps and Leaflet.



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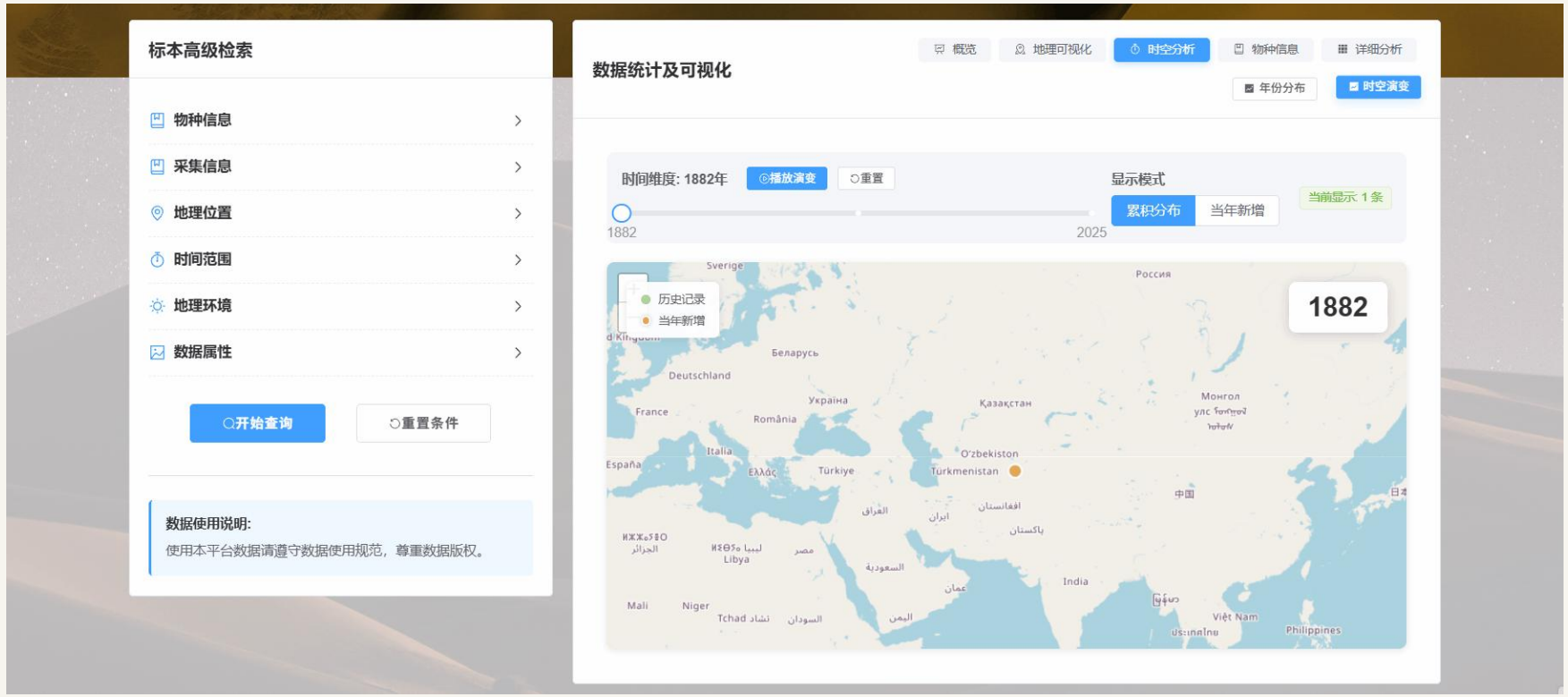


- The dual-engine architecture guarantees smooth rendering and high accuracy.
- Offers a variety of grid analysis modes.
- **Provides a feature for dynamically visualizing the spatiotemporal change of plant specimen collection.**

Challenges in Handwritten Cyrillic Text Recognition.

Aged specimen labels

The extreme age of the specimens renders the handwritten text on labels illegible.

Paper deterioration

Aged specimens often suffer from paper deterioration and illegible handwriting.

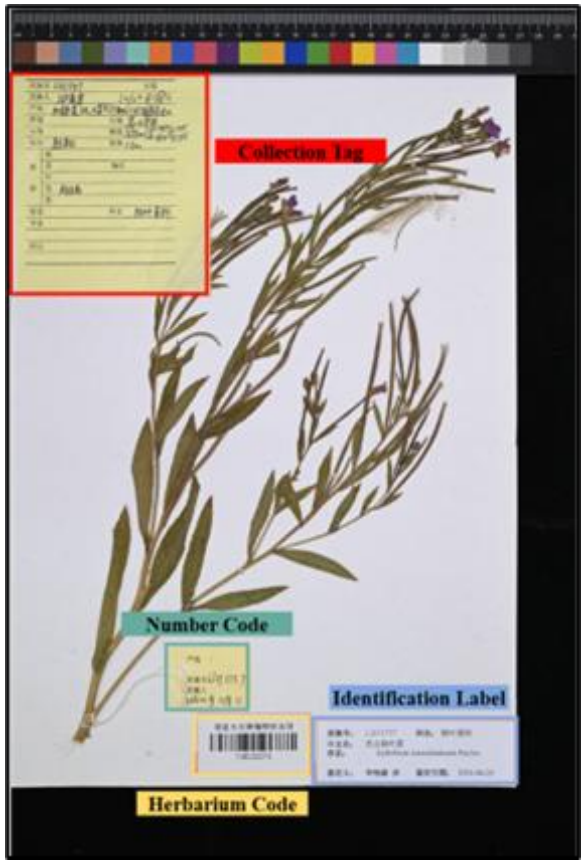
Language Barriers

The linguistic landscape of Central Asia is highly complex due to a combination of factors.



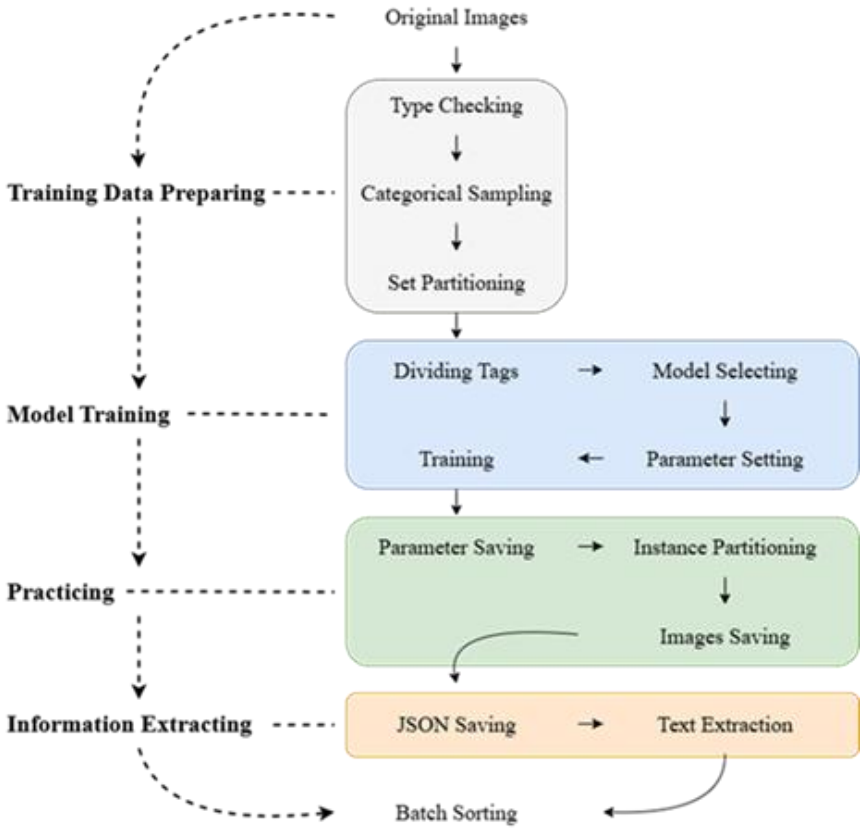
Computer Vision

Utilizing the YOLO model to automatically detect information in specimens.



OCR & LLM

Empowered by a fine-tuned OCR model and a Large Language Model for automated extraction of specimen label data.



Academician Ma Keping
Academician Komiljon Tojibaev
Academician Hikmat Hisoriev
Prof. Mariyo Boboev
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Thank you for your attention!



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