

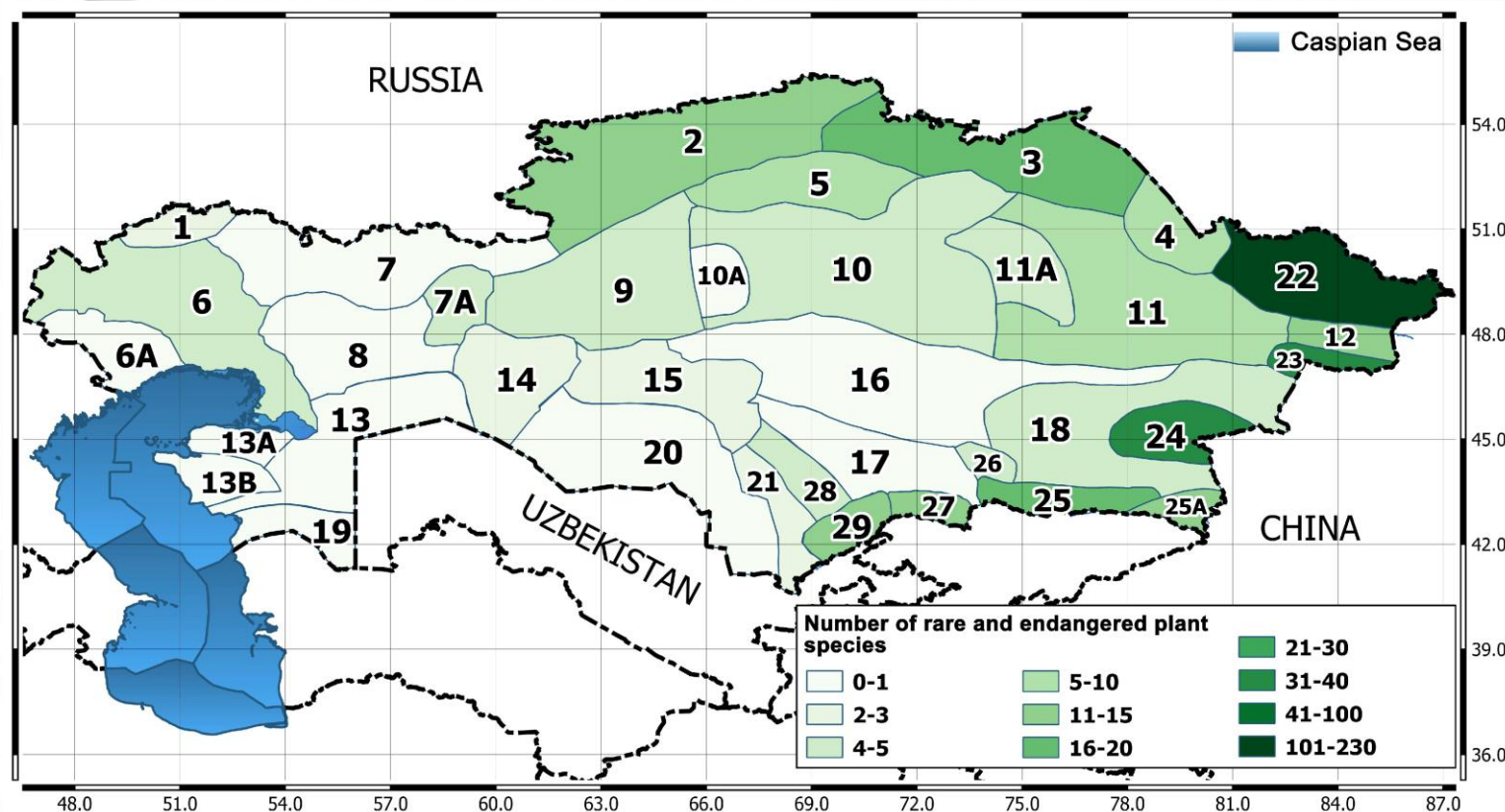
**AL-FARABI KAZAKH NATIONAL UNIVERSITY
FACULTY OF BIOLOGY AND BIOTECHNOLOGY
DEPARTMENT OF BOTANY AND AGROECOLOGY**

LECTURE 7

Review of endemic and relict plants of the Kazakh Altai

**Lecturer: Doctor of Biological Sciences, Professor
Kurmanbayeva M.S.**

**Course title: Conservation of Rare and Endangered Plant
Species**



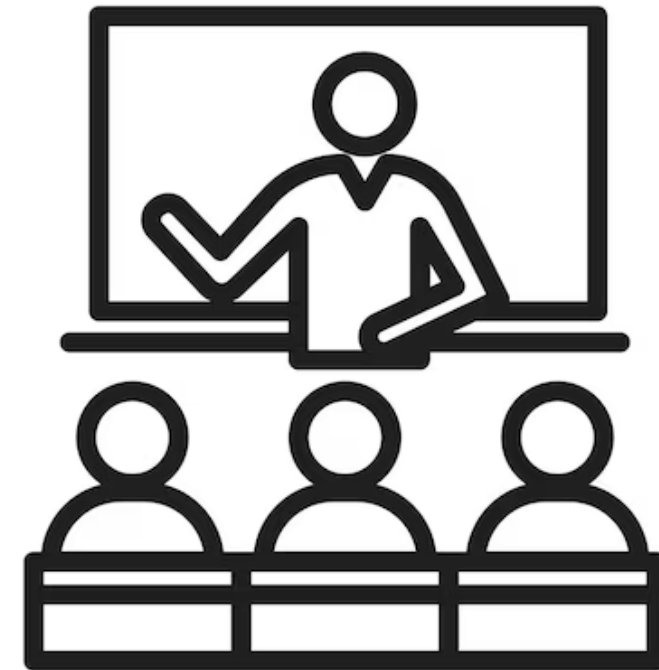
LESSON PLAN (50 MIN)

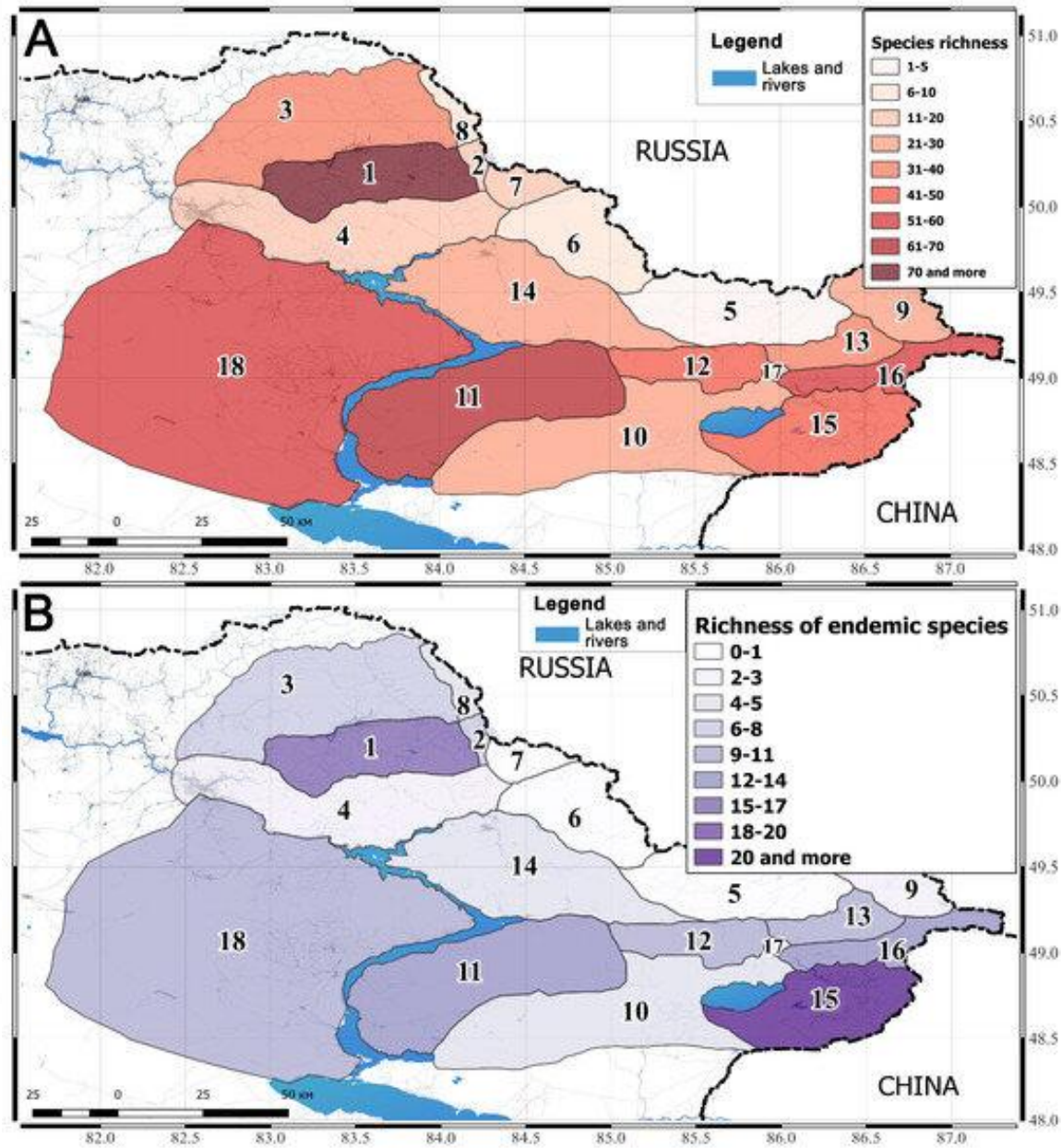
1. Introduction (5 min)

- Topic and aims of the lesson.
- Location and features of the kazakh altai (mountain system, climate, flora diversity).
- Importance of the region as a center of endemism.

2. Main part (35 min)

- **Key terms (5 min):** endemic, relict, alpine flora.
- **Natural conditions (5 min):** mountain climate, high humidity, altitudinal zonation.
- **Examples of plants (20 min):**
 - *Endemic species: oxytropis altaica, papaver pavlovii, dracocephalum grandiflorum, astragalus altaicus.*
 - *Relict species: betula rotundifolia, larix sibirica, adoxa moschatellina.*
 - Adaptations: cold resistance, short vegetation period, compact growth forms.
- **Conservation (5 min):** threats — mining, tourism; protection in katon-karagai national park and markakol reserve.
- **3. Conclusion (10 min)**
- Summary of key points.





Endemic and Relict Plants of the Kazakh Altai: A Biodiversity Treasure at Risk

A review of the unique flora of the Kazakh Altai region, focusing on rare, endemic, and relict species, and highlighting the critical need for conservation.

The Kazakh Altai: A Biodiversity Hotspot



Altai-Sayan Ecoregion

The Kazakh Altai forms a crucial part of the Altai-Sayan Ecoregion, which is recognised as one of Central Asia's richest centres of plant endemism. This region acts as a vital refuge for ancient and newly evolved species.



Rich Floristic Diversity

The region is home to over 2,465 vascular plant species. Significantly, 150–200 of these species are endemic to the broader Altai-Sayan system, underscoring the area's importance to global biodiversity.



Complex Habitats

Diverse landscapes—from arid semi-deserts and extensive steppes to towering alpine zones—create a complex mosaic of unique habitats. This topographic variability promotes high species richness and the evolution of specialised flora.

230 Rare and Endangered Species Documented

A comprehensive review was conducted, involving the critical examination of 65,540 herbarium specimens sourced from eight major institutional collections. This meticulous work provided the foundation for establishing the current conservation status of the region's flora.

This study successfully identified 230 rare and endangered vascular plants. Among these, **73 are classified as strict endemics**, meaning they are entirely unique to the Kazakh Altai territory and found nowhere else in the world.

Notably, the plant families Poaceae (grasses) and Orchidaceae (orchids) are significantly represented among the identified threatened taxa, often due to habitat loss and overgrazing pressures.



65,540

Specimens Analysed

230

Rare & Endangered Species

73

Strict Endemics Identified

Relict Plants of the Kazakh Altai: Survivors of Time

Relict species are remnants of ancient flora that survived significant geological or climatic changes. Their presence in the Kazakh Altai provides a living record of the region's evolutionary history.

Altai Daphne (*Daphne altaica*)

Family: Thymelaeaceae. A small shrub found in rocky areas of Altai, Tarbagatai, Manrak, and Saur Mountains. Its inclusion in the Red Book of Kazakhstan signifies its vulnerable status.

Siberian Trout Lily (*Erythronium sibiricum*)

Family: Liliaceae. Distinguished by its beautiful purple flowers, this species occurs exclusively in the Southern and Western Altai Mountains, demanding specific habitat protection.

Schrenk's Spiraeanthus (*Spiraeanthus schrenkianus*)

Family: Rosaceae. A rare flowering shrub primarily found in the Karatau Mountains, representing a lineage that has persisted despite environmental shifts.

Ili Ferula (*Ferula iliensis*)

Family: Apiaceae. Found in the Altyn-Emel National Park, this towering perennial herb is valued both scientifically and culturally, making its conservation a priority.

Endemic Plants of the Kazakh Altai: Unique to the Region



Kaufmann's Tulip (*Tulipa kaufmanniana*)

Family: Liliaceae. Grows in the rocky, mountainous areas across Southern Kazakhstan and into the Altai fringe. Known for its large, striking flowers.



Altai Onion (*Allium altaicum*)

Family: Amaryllidaceae. This specific species of wild onion is restricted to the high Altai region, demonstrating adaptation to local conditions.



Karatay Columbine (*Aquilegia karatavica*)

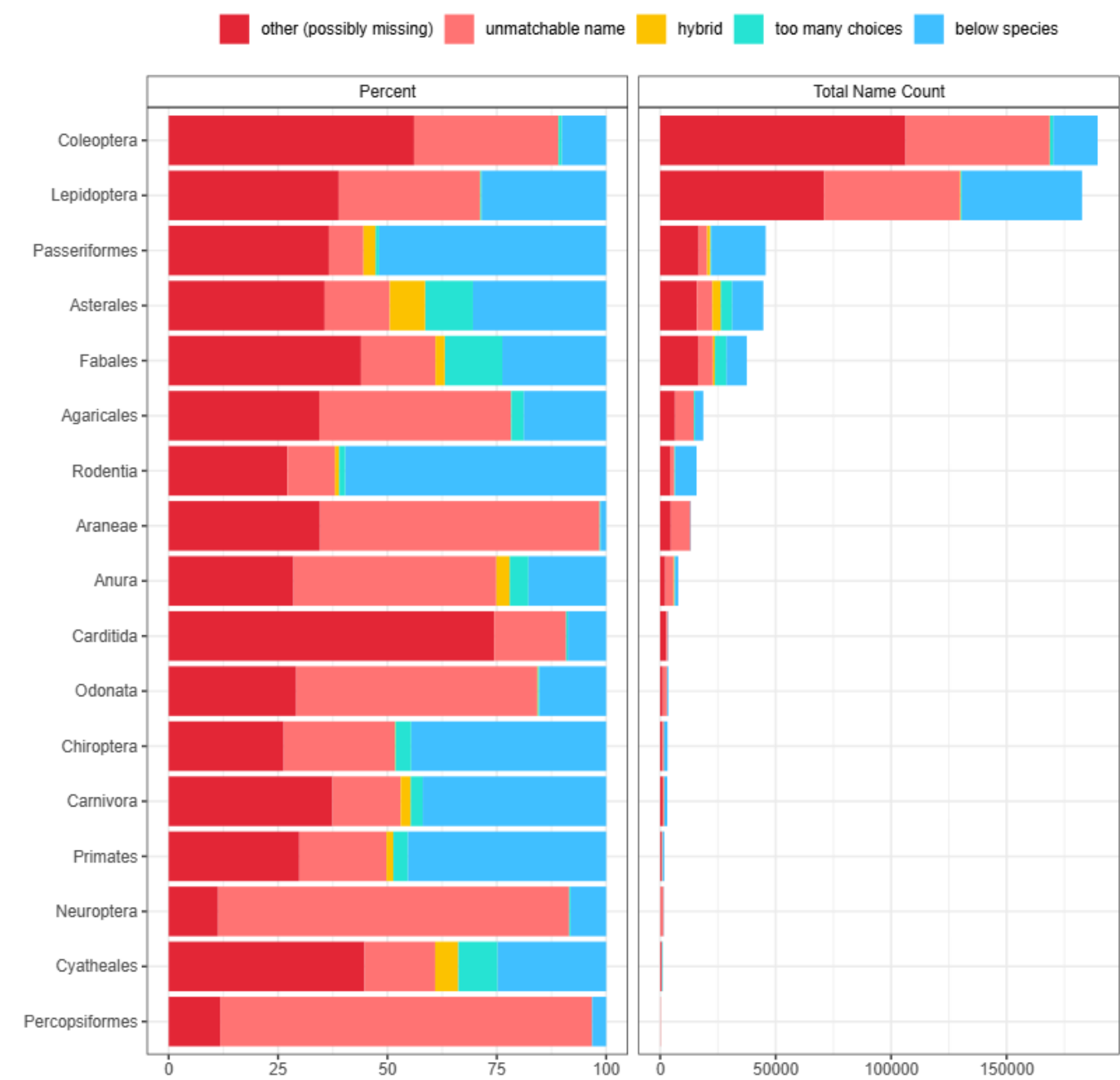
Family: Ranunculaceae. A delicate plant distributed in Southern Kazakhstan and parts of the Kazakh Altai, often found in shaded rocky crevices.

Data Limitations According to GBIF Records

Data from the Global Biodiversity Information Facility (GBIF) concerning the endemic and relict flora of the Kazakh Altai often shows gaps. This limitation is primarily driven by the region’s challenging geography, making fieldwork difficult and dangerous, and resulting in inaccessibility for systematic data collection.

This situation significantly complicates effective biodiversity monitoring and evidence-based conservation efforts, creating 'data deficient' status for many unique species.

Furthermore, the protection status of many rare species, coupled with incomplete and unsystematic data collection, contributes to a general underrepresentation in global databases.





The Red Book of Altai Mountain Country Plants



Collaborative Monitoring

This Red Book is a crucial collaborative dataset monitoring rare and endemic species across Russia, Kazakhstan, China, and Mongolia—the four countries sharing the Altai mountain system.



Extensive Data Foundation

The work is underpinned by over 450,000 herbarium specimens, forming the historical backbone for ongoing biodiversity informatics efforts and status assessments.



Targeted Conservation

The project provides precise, geo-referenced data on species locations. This information is critical for developing targeted conservation planning and establishing effective protected zones.

Why Protect Kazakh Altai's Endemic Flora?

→ Irreplaceable Genetic Reservoirs

Endemic species are unique genetic resources that reflect millions of years of evolutionary history. Their loss represents an irreplaceable reduction in the global genetic library.

→ Ecosystem Resilience

The survival of these unique plants contributes directly to overall ecosystem stability and resilience, especially in the face of escalating threats from climate change and human developmental pressures.

→ Potential Medicinal Resources

Protecting this flora also safeguards local cultural heritage and preserves potential medicinal resources. Many local plants hold undiscovered compounds of pharmacological significance.

Call to Action: Securing the Future of Kazakh Altai's Botanical Heritage

Expand Protected Areas

Prioritise the establishment and expansion of protected areas around known biodiversity hotspots and the habitats of strict endemic species.

Support Ex Situ Conservation

Fund and support botanical gardens and specialised programs for the **ex situ** (off-site) propagation of rare and critically endangered plants.

Enhance Research

Intensify field and laboratory research, particularly targeting "Data Deficient" species, to accurately assess their conservation status and biological needs.

Foster Collaboration

Promote strong regional and international collaboration among scientists, governments, and NGOs for sustainable ecosystem management across the Altai region.

❏ Conservation efforts today will determine the survival of this unique genetic heritage for generations to come. Support the Altai's plants—they are irreplaceable.