Lesson 4

Topic: «Angiosperm Plants of the Kyrgyz Republic. Class Dicotyledons. Orders Polygonales, Juglandales, Primulales, Brassicales, Saxifragales. Rare and Endemic Species (Alai Iskandera and others)».

Aim of the lesson: To study the systematic position, morphological features and distribution of representatives of the families Polygonaceae, Juglandaceae, Primulaceae, Brassicaceae and Saxifragaceae in the flora of the Kyrgyz Republic; to become familiar with rare and endemic species (including Alai iskandera) and measures for their conservation.

Learning objectives:

1. To study the theoretical aspects of systematics and morphology of the families Polygonaceae, Juglandaceae, Primulaceae, Brassicaceae and Saxifragaceae of the flora of the KR.
2. To understand the importance of rare and endemic species, the reasons for their vulnerability and the principles of biodiversity conservation.

The student should know:

1. The systematic position and diagnostic characters of the families Polygonaceae, Juglandaceae, Primulaceae, Brassicaceae, Saxifragaceae.
2. The main genera and species of these families in the territory of Kyrgyzstan; their ecology and economic importance.
3. The characteristics of rare and endemic species (including Iskandera alaica), their status in the Red Data Book of the KR and conservation measures.

The student should be able to:

Identify plants by morphological characters, analyse ranges and draw conclusions about the degree of rarity and endemism of species.

INFORMATION BLOCK

Family Polygonaceae (Buckwheat family)

Herbs, shrubs, less often trees and lianas. A characteristic feature is the ochrea — fused stipules sheathing the stem. Flowers are small, usually in racemes or panicles. The perianth is simple, 3–6-merous. The fruit is a three-angled nutlet. In the flora of Kyrgyzstan the genera Polygonum, Rumex, Rheum, Atraphaxis and others are represented. Many species are forage, medicinal or weedy. There are endemic species of knotweeds.

Family Juglandaceae (Walnut family)

Trees with imparipinnate leaves. Flowers are unisexual, arranged in catkins. The fruit is a drupe or a nut. In the flora of Kyrgyzstan the most important representative is the Persian walnut (Juglans regia), which forms unique walnut-fruit forests on the slopes of the Chatkal and Fergana ranges. These communities are of global importance as centres of origin and diversity of the cultivated walnut. Walnut forests require strict protection.

Family Primulaceae (Primrose family)

Predominantly perennial herbs. Leaves are often in a basal rosette. Flowers are pentamerous, usually brightly coloured. The fruit is a capsule. In the flora of the KR species of the genera Primula, Androsace, Cortusa and others occur. Many species are ornamental and used in floriculture. A number of high-mountain species have limited distribution and require protection.

Family Brassicaceae (Cruciferae, Mustard family)

Herbaceous plants (less often subshrubs). Flowers have four petals arranged crosswise; six stamens (four long and two short). The fruit is a silique or silicle. One of the richest families of the flora of Kyrgyzstan (about 200 species). Many species are weeds, forage, medicinal and food plants. Among the crucifers there are many endemics of Central Asia.

Alai iskandera (Iskandera alaica (Korsh.) Botsch. et Vved.) is an extremely rare narrow endemic, the only representative of the genus in the republic. A perennial plant with a woody multi-headed caudex and leafless glabrous stems 20–50 cm tall. Petals are purple, 20–25 mm long. It grows on clayey-limestone deposits of the middle and upper mountain belts in the Alai Valley (slopes of Kyzyl-Eshme, Kashka-Suu river basin) and on the northern macroslope of the Trans-Alai Range. The number of individuals is very low. The limiting factor is unregulated grazing. It is included in the Red Data Book of the KR (status VU). Organisation of a botanical sanctuary in the Kashka-Suu river basin is recommended.

Family Saxifragaceae (Saxifrage family)

Perennial herbs, often cushion-forming. Leaves are usually in a basal rosette. Flowers are pentamerous. The fruit is a capsule. In the flora of Kyrgyzstan the genera Saxifraga, Bergenia and others are represented. Many species are ornamental and medicinal plants of the highlands. A number of species have narrow ranges and need protection.

Rare and endemic species. Conservation

The flora of Kyrgyzstan is characterised by a high level of endemism. Among the families under consideration the crucifers are especially rich in endemics. The main threats are overgrazing, ploughing, plant collection and climate change. Conservation is carried out through the Red Data Book of the KR, protected areas and population monitoring.

Self-check tests

Choose one or more correct answers:

1. A characteristic feature of the family Polygonaceae is:
   A. presence of ochrea;
   B. crosswise arrangement of petals;
   C. fruit — a berry;
   D. milky sap.
2. The Persian walnut (Juglans regia) in the flora of Kyrgyzstan forms:
   A. steppe communities;
   B. unique walnut-fruit forests;
   C. tugai forests;
   D. alpine meadows.
3. Alai iskandera belongs to the family:
   A. Polygonaceae;
   B. Brassicaceae;
   C. Primulaceae;
   D. Saxifragaceae.
4. The main limiting factor for Alai iskandera is:
   A. lack of moisture;
   B. unregulated livestock grazing;
   C. low temperatures;
   D. competition with trees.
5. The fruit of crucifers is:
   A. a nutlet;
   B. a silique or silicle;
   C. a capsule;

D. a berry.

6. Alai iskandera grows:

A. in the Chui Valley;
B. in the Alai Valley;
C. around Issyk-Kul;
D. everywhere.

7. The family Primulaceae is characterised by:

A. flowers in catkins;
B. often a basal leaf rosette and brightly coloured flowers;
C. presence of ochrea;
D. pinnate leaves.

8. The status of Alai iskandera in the Red Data Book of the KR is:

A. CR;
B. VU;
C. LC;
D. not included.

9. Walnut forests of Kyrgyzstan are important as:

A. a source of timber;
B. centres of origin and diversity of the cultivated Persian walnut;
C. pastures;
D. sites of mineral extraction.

Self-check questions

1. Characterise the family Polygonaceae. What features allow reliable identification of its representatives?

2. What is the importance of the Persian walnut and the walnut forests of Kyrgyzstan?

3. Describe Alai iskandera: morphology, range, conservation status, threats.

4. List the diagnostic characters of the family Brassicaceae.

5. What measures for the conservation of rare species of the families under consideration are applied in Kyrgyzstan?

6. Briefly characterise the families Primulaceae and Saxifragaceae in the flora of the KR.

Situational tasks

Task 1

During a survey of the Alai Valley on clayey-limestone slopes a perennial plant with leafless stems, purple petals about 2 cm long and siliques was found. The number of individuals is extremely low.

Question: To which species does the plant most likely belong? What is its conservation status and what protection measures can be recommended?

Task 2

Students are studying the walnut-fruit forests of the Chatkal Range. It is necessary to assess their conservation and economic importance.

Question: Why are the walnut forests of Kyrgyzstan of global importance? What threats do they face and what protection measures are needed?

Task 3

When comparing herbarium specimens of crucifers, differences in fruit structure (siliques and silicles) and leaf shape were noted.

Question: What characters are diagnostic for the family Brassicaceae? Give examples of useful and weedy species of this family in the flora of the KR.

Task 4

In the Red Data Book of the KR Alai iskandera has the status VU. Only 2–3 localities are known.

Questions:
1. How does a narrow endemic differ from a widespread rare species?
2. What population parameters need to be monitored?
3. Propose a scheme for organising a sanctuary for the protection of the species.

Task 5

During a study of the high-mountain flora specimens of primulaceous and saxifragaceous plants with basal rosettes and brightly coloured flowers were collected.

Question: How can representatives of Primulaceae and Saxifragaceae be distinguished? What ecological conditions do high-mountain species of these families prefer?

Laboratory practical work

“Study of morphological features of representatives of the families Polygonaceae, Juglandaceae, Primulaceae, Brassicaceae and Saxifragaceae of the flora of Kyrgyzstan. Identification of rare and endemic species”

Assignment

1. Study herbarium specimens of representatives of the families Polygonaceae, Juglandaceae, Primulaceae, Brassicaceae, Saxifragaceae.
2. Compile morphological descriptions of 4–5 species (one from each family).
3. Determine the systematic position of Alai iskandera; indicate its conservation status and range in the KR.
4. Compare the characters of the families and draw conclusions.

Procedure

1. Using a key establish the specific identity of the specimens.
2. Fill in the comparative table of family characters.
3. On a contour map of Kyrgyzstan mark the known localities of Alai iskandera and of walnut forests.
4. Formulate conclusions about the importance of the families and the priorities of conservation.

Recommended literature: Flora of the Kirghiz SSR; Red Data Book of the Kyrgyz Republic. — Bishkek, 2007; Lazkov G.A., Umralina A.R. Endemic and rare plant species of Kyrgyzstan (Atlas).