Lesson 6

Topic: «Angiosperm Plants of the Kyrgyz Republic. Class Monocotyledons. Orders Liliales, Iridales, Orchidales. Rare and Endemic Species (Eduard’s Fritillary)».

Aim of the lesson: To study the systematic position, morphological features and distribution of representatives of the families Liliaceae, Iridaceae and Orchidaceae in the flora of the Kyrgyz Republic; to become familiar with rare and endemic species (including Eduard’s fritillary — Aigul) and measures for their conservation.

Learning objectives:

1. To study the theoretical aspects of systematics and morphology of the families Liliaceae, Iridaceae and Orchidaceae 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 Liliaceae, Iridaceae, Orchidaceae.
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 Fritillaria eduardii), 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

Class Monocotyledons (Liliopsida, Monocotyledones)

The embryo of the seed has one cotyledon, the root system is usually fibrous, leaves have parallel or arcuate venation, and vascular bundles are closed. In the flora of Kyrgyzstan monocotyledons constitute a smaller part of the species compared with dicotyledons, but include many economically important and ornamental plants as well as a number of rare and endemic species.

Family Liliaceae (Lily family)

Perennial herbs, usually with bulbs or rhizomes. Leaves are simple, often in a basal rosette or cauline. Flowers are usually large, trimerous, with a simple perianth of six segments. The fruit is a capsule or a berry. In the flora of Kyrgyzstan the genera Tulipa (tulip), Fritillaria (fritillary), Gagea, Eremurus (foxtail lily), Allium (onion) and others are represented. Many species are ornamental and are objects of conservation.

Eduard’s fritillary (Fritillaria eduardii Regel; local name — Aigul, “moon flower”) is a highly decorative species threatened with extinction (status EN in the Red Data Book of the KR). The stem reaches 100–150 cm in height. Leaves are lanceolate. Flowers are large (about 6 cm), orange or dark yellow, arranged in an inflorescence. In Kyrgyzstan it occurs extremely locally: two localities in the Turkestan Range (northern slopes of Aigul-Tash and the Laili-Mazar gorge in Batken Province). The species is at the northern limit of its range, detached from the main part (Tajikistan, Uzbekistan, northern Afghanistan). Limiting factors are livestock grazing and collection of flowers for bouquets. The Aigul-Tash nature sanctuary has been established. Strict protection of populations, a ban on collection and regulation of grazing are necessary.

Family Iridaceae (Iris family)

Perennial herbs with rhizomes, corms or bulbs. Leaves are sword-shaped or linear, distichous. Flowers are zygomorphic or actinomorphic, trimerous. The fruit is a capsule. In the flora of Kyrgyzstan the genera Iris, Juno, Iridodictyum, Crocus and others are represented. Many species are ornamental. There are endemic and subendemic species (e.g. Juno zenaidae, Iridodictyum kolpakowskianum) included in the Red Data Book of the KR.

Family Orchidaceae (Orchid family)

Perennial herbs, often with tubers or rhizomes. Flowers are strongly zygomorphic, with a characteristic lip (labellum). The fruit is a capsule with numerous minute seeds. In the flora of Kyrgyzstan orchids are represented by a relatively small number of species (genera Orchis, Dactylorhiza, Epipactis, Cephalanthera, etc.). Many species are sensitive to habitat disturbance and need protection. Orchids are indicators of the integrity of natural communities.

Rare and endemic species. Conservation

Among the monocotyledons of the flora of Kyrgyzstan, bulbous and tuberous plants (tulips, fritillaries, irises, junos) are especially vulnerable, suffering from collection for bouquets and grazing. The main conservation measures are: inclusion in the Red Data Book of the KR, establishment of protected areas (including the Aigul-Tash sanctuary), bans on collection, population monitoring and introduction into botanical gardens.

Self-check tests

Choose one or more correct answers:

1. The class Monocotyledons includes plants in which:
   A. the seed embryo has two cotyledons;
   B. the seed embryo has one cotyledon;
   C. leaf venation is reticulate;
   D. the root system is a taproot.
2. Eduard’s fritillary (Aigul) belongs to the family:
   A. Iridaceae;
   B. Liliaceae;
   C. Orchidaceae;
   D. Poaceae.
3. The main range of Eduard’s fritillary in Kyrgyzstan is:
   A. the Chui Valley;
   B. the Turkestan Range (Batken Province);
   C. the Issyk-Kul basin;
   D. the Central Tien Shan.
4. The status of Eduard’s fritillary in the Red Data Book of the KR is:
   A. VU;
   B. EN;
   C. LC;
   D. not included.
5. A characteristic feature of the family Orchidaceae is:
   A. flowers with a lip (labellum);
   B. presence of ochrea;
   C. fruit — a silique;
   D. milky sap.
6. The main threats to Eduard’s fritillary are:
   A. livestock grazing and flower collection;
   B. waterlogging;

C. invasive species;
D. lack of light.

7. The family Iridaceae is characterised by:

A. sword-shaped distichous leaves;
B. compound leaves;
C. opposite leaves;
D. presence of tendrils.

8. The local name of Eduard’s fritillary in Kyrgyzstan is:

A. Mary’s root;
B. Aigul;
C. golden root;
D. ginseng.

9. For the protection of Eduard’s fritillary the following has been established:

A. Sary-Chelek Reserve;
B. Aigul-Tash sanctuary;
C. Ala-Archa National Park;
D. Issyk-Kul Reserve.

Self-check questions

1. Give a general characterisation of the class Monocotyledons. How does it differ from the class Dicotyledons?

2. Describe the diagnostic characters of the family Liliaceae. Give examples of genera from the flora of Kyrgyzstan.

3. What is the systematic position, morphology and range of Eduard’s fritillary? Why does it need protection?

4. List the diagnostic characters of the families Iridaceae and Orchidaceae.

5. What measures for the conservation of rare monocotyledonous plants are applied in Kyrgyzstan?

6. Why are bulbous and tuberous plants especially vulnerable?

Situational tasks

Task 1

During a survey of the northern slopes of Mount Aigul-Tash (Batken Province) a population of a tall bulbous plant with large orange-yellow flowers was found. Local people call it Aigul.

Question: To which species does the plant belong? What is its conservation status and what protection measures have already been taken and are additionally needed?

Task 2

Students are comparing herbarium specimens of lilies, irises and orchids.

Question: What morphological characters allow these three families to be reliably distinguished? Compile a brief comparative table.

Task 3

Eduard’s fritillary has the status EN and is known in Kyrgyzstan from only two localities.

Questions:
1. How does a species with a disjunct range at the northern limit of distribution differ from a widespread species?
2. What population parameters need to be monitored?
3. What additional protection measures can be proposed?

Task 4

Introduction of Eduard’s fritillary and rare irises is being carried out in a botanical garden.

Question: What is the importance of introducing rare species into botanical gardens? What conditions are necessary for successful cultivation of bulbous plants?

Task 5

During a study of high-mountain meadows specimens of orchids with a characteristic flower lip were collected.

Question: Why are orchids considered indicators of the integrity of natural communities? What threats are most dangerous for the orchids of Kyrgyzstan?

Laboratory practical work

“Study of morphological features of representatives of the families Liliaceae, Iridaceae and Orchidaceae of the flora of Kyrgyzstan. Identification of rare and endemic species”

Assignment

1. Study herbarium specimens of representatives of the families Liliaceae, Iridaceae, Orchidaceae.
2. Compile morphological descriptions of 3 species (one from each family), including Eduard’s fritillary (from descriptions and images).
3. Determine the systematic position of Eduard’s fritillary; 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 Eduard’s fritillary.
4. Formulate conclusions about the importance of the families and the priorities of conservation of monocotyledonous plants.

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).