

Ministry education and Science of Republic of Kazakhstan
Karaganda State University named after academician Ye.A.
Buketov

Biological and geographical faculty

Botany Department

Course – Botany
Specialty - 5B011300 – «Biology»

Lecture № 25

**Characteristic of families Aralliaceae,
Apiaceae, Solanaceae, Scrophulariaceae,
Plantaginaceae, typical species and
practical uses**

(1 hour)

Lecturer: candidate of biological science, associated professor
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Plan of lecture:

- 1 Family Aralliaceae.
- 2 Family Apiacea.
- 3 Family Solanaceae.
- 4 Family Scrophulariaceae.
- 5 Family Plantaginaceae.

Main literatures:

- 1 Еленевский А.Г., Соловьев М.П., Тихомиров В.Н. Ботаника: систематика высших, или наземных, растений. 2 изд. - М.: Academia, 2001. - 429 с.
- 2 Нестерова С.Г. Лабораторный практикум по систематике растений. - Алматы: Қазақ ун-ті, 2011. - 220 с.
- 3 Родман А.С. Ботаника. – М.: Колос, 2001. - 328 с.

Additional literatures:

- 1 Билич Г.Л., Крыжановский В.А. Биология. Т. 2: Ботаника. - М.: Оникс 21 век, 2002. - 543 с.
- 2 Ишмуратова М.Ю. Систематика и интродукция растений (курс лекций). - Караганда: РИО Болашак-Баспа, 2015. - 100 с.
- 3 Тусупбекова Г.Т. Основы естествознания. Ч. 1. Ботаника. – Астана: Фолиант, 2013. – 321 с.

Family *Araliaceae*

Family includes 80 genera and about 850 species.

Spreading – tropical and sub-tropical zones of Eastern Asia.

Life forms – trees, bushes and grassy plants.

Flowering formula - $*Ca_5 Co_5 A_5 G(2-5)$

Pollination – by insects.

Important genera - *Aralia*, *Panax*, *Eleutherococcus*, *Hedera*.

Practical uses – medical and decorative.



Aralia mandjurica



Eleuterococcus



Panax

Family Apiaceae (Umbelliferae)

Large, evolutionary young family, consists from 300 genera and more than 3000 species. All species accumulate essential oils.

Spreading – all world, mostly – continental zone of Eurasia and Southern America.

Life forms – annual and perennial grassy plants, rare – trees.

Flowering formula - $*Ca(5) Co(5) A 5 G (2)$.

Pollination – by insects.

Important genera – Apium, Seseli, Sium, Conium, Cicuta, Pastinaca, Ferula, Eryngium, Heracleum, etc.

Practical uses – medical, food, fodder, aromatic, essential oil, decorative, poison plants.



Apium sativum



*Comium
maculatum*



Cicutia virosa

Systematic position

Class: Dicotyledonae

Sub-class: Gamopetalae

Series: Bicarpellatae

Order: Polemoniales

Family: Solanaceae

General characters

Distribution

Solanaceae includes about 90 genera and more than 2,800 species. The plants are widely distributed in tropical and subtropical regions. In India, this family is represented by 21 genera and 70 species.

Habit

Mostly annual herbs (eg. *Solanum melongena*), a few shrubs eg. *Solanum torvum* (Sundaikaai) and rarely trees (*S. giganteum*).

Floral Formula

Br., Ebrl., \otimes , $\overline{\sigma}$, $K_{(2)}$, $\overbrace{C_{(2)}}$, A_2 , $\underline{G}_{(2)}$

Flower

Bracteate (eg. *Petunia hybrida*) or ebracteate eg. *S. nigrum* (Manathakkaali), ebracteolate, pedicellate, dichlamydeous, pentamerous, complete, actinomorphic (eg. *Datura stramonium*) or Zygomorphic (eg. *Schizanthus pinnatus*), bisexual and hypogynous.

Calyx

Sepals 5, green, gamosepalous, tubular and showing valvate aestivation eg. *Datura metal* (Oomathai) or imbricate aestivation (eg. *Petunia hybrida*), bell shaped and persistent (*S. melongena*).

Corolla

Petals 5, gamopetalous, funnel shaped, rotate, tubular, usually plicate (folded like a fan blade) showing twisted or valvate or imbricate aestivation.

Androecium

Stamens 5, epipetalous, alternate with the petals, usually not equal in length and filaments are inserted in the middle or basal region of corolla tube and basifixed. Anthers ditheous, introrse, usually basifixed or dorsifixed, dehiscing longitudinally or through apical pores (eg. *S. nigrum*). In *Schizanthus pinnatus*, two stamens are fertile and three stamens are reduced to staminodes.

Gynoecium

Ovary superior, bicarpellary and syncarpous. Ovary bilocular, carpels obliquely placed and ovules on axile placentation. In *Datura* species, bilocule becomes tetralocular by the formation of false septa. Style simple and undivided. Stigma bifid or capitate.

ECONOMIC IMPORTANCE

- 1. Food plants** Tubers of *Solanum tuberosum* (potato) are used as common vegetable throughout the world. Tender fruits of *S. melongena* (brinjal) and ripened fruits of *Lycopersicon esculentum* (tomato) are used as delicious vegetables.
- 2. Medicinal plants** Roots of *Atropa belladonna* yield powerful alkaloid 'atropine'. It is used for relieving muscular pain. Leaves and flowers of *Datura stramonium* are the sources of drug 'stramonium' used to treat asthma and whooping cough. Leaves, flowers, berries of *Solanum trilobatum* (thoodhuvalai) are used to treat cough. Roots and leaves of *Withania somnifera* (Amukkara) are used to treat nervous disorder and are diuretic apart from useful tonic.
- 3. Tobacco Leaves** of *Nicotiana tabacum* (tobacco) contain alkaloids nicotine, nornicotine and anabasine. Nicotine is considered to be the principal alkaloid in commercial tobaccos such as cigarette, bidi, pipes and hukkah as well as chewing and snuffing. It is also used as sedative, antispasmodic and insecticide.
- 4. Ornamental plants** *Cestrum diurnum* (day jasmine), *C. nocturnum* (night jasmine) and *Petunia hybrida* (pink flower) are grown in gardens for their beautiful flowers.



**Hyoscyamus
niger**



**Atropa bella
donna**



**Datura
stramonium**

Family *Scrophulariaceae*

Large family, includes 350 genera and about 4500-5000 species.

Spreading – all world, mostly – in tropical zone.

Life forms – grassy plants and bushes.

Flowering formula - $\uparrow \text{Ca} (3+2) \text{Co}(2+3) \text{A}_4 \text{G} (2)$

Pollination – by insects.

Important genera – *Linaria*, *Digitalis*, *Veronica*, *Verbascum*, *Euphrasia*, *Scrophularia*, *Pedicularis*, etc.

Practical uses: medical, meadow and decorative plants.



**Verbascum
thapsus**



**Digitalis
purpurea**



Euphrasia

Family *Plantaginaceae*

Small family, includes 3 genera and about 270 species.

Spreading – continental zone of all world.

Life form – grassy plants.

Flowering formula - $\ast Ca(5) Co5 A 5 G1$

Pollination – by wind.

Important genus - *Plantago*.

Practical uses – medical.



Plantago major



Plantago psyllium

Control questions:

- 1 Answer the following questions in two or three sentences.
- 2 What is atropine?
- 3 Give the systematic position of Solanaceae.
- 4 Write the binomials of any three medicinally useful plants in Solanaceae
- 5 Describe the gynoecium of members of Solanaceae.
- 6 Write the different types of inflorescence found in Solanaceae. Give examples for each.
- 7 Draw the floral diagram and write the floral formula of *Datura metel*.
- 8 Write any three binomials of food plants of Solanaceae.
- 9 Name the alkaloids found in tobacco.

Test questions:

Choose and write the correct options.

1. Solanaceae is placed under
 - a. Malvales
 - b. Polemoniales
 - c. Unisexuales
 - d. Ranales.
 2. In which of the following plants the midrib and veins are found with yellowish spines
 - a. *Solanum melongena*
 - b. *Datura metal*
 - c. *Solanum xanthocarpum*
 - d. *Petunia hybrida*.
 3. The carpels are obliquely placed in the members of
 - a. Malvaceae
 - b. Solanaceae
 - c. Euphorbiaceae
 - d. Musaceae
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