

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 № 26

## **Characteristic of families Lamiaceae and Asteraceae, typical species and practical uses**

(1 hour)

Lecturer: candidate of biological science, associated professor  
Ishmuratova Margarita Yulaevna



# Plan of lecture:

- 1 Family Lamiaceae.
- 2 Family Asteraceae.
- 3 Typical species.
- 4 Practical uses of species.

## **Basic 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 *Lamiaceae* (*Labiatae*)**

Big family, includes 270 genera and more than 5500 species.

**Spreading** – all world, mostly – Central Asia and Mediterranean.

**Life forms** – grassy plants, semi-shrubs and bushes. All species have four-angled stalk. Most species have glandular trichomes, essential oil glandular.

**Flowering formula** -  $\uparrow Ca(2+3) Co(2+3) A_3 G (2)$

**Pollination** – by insects.

**Important genera** – Mentha, Origanum, Melissa, Salvia, Thymus, Ziziphora, Ajuga, Dracocephalum, Nepeta, etc.

**Practical uses:** medical, essential oil, food, aromatic, decorative plants.

Важнейшие роды – мята (*Mentha*), душица (*Origanum*), шалфей (*Salvia*), яснотка (*Lamium*), пустырник (*Leonurus*), зопник (*Phlomis*), тимьян (*Thymus*), чистец (*Stachys*) (рис. 137).

### **Хозяйственное значение:**

*Лекарственные* – у представителей семейства найдены эфирными масла, терпеноиды, сапонины, полифенолы и танниды, кумарины и др.; медицинское применение находят: мята перечная (*Mentha piperita*), пустырник пятилопастный и сердечный (*Leonurus quinquelobatus* и *L. cardiaca*), шалфей лекарственный (*Salvia officinalis*), тимьян обыкновенный и ползучий (чабрец) (*Thymus vulgaris* и *T. serpyllum*), душица обыкновенная (*Origanum vulgare*).

*Пищевые* – мята, душица, тимьян являются пряными травами.



*Mentha piperita*



*Salvia officinalis*



*Thymus serpyllum*

### **Systematic position**

Class: Dicotyledonae

Sub-class: Gamopetalae

Series: Inferae

Order: Asterales

Family: Asteraceae

### ***General characters***

### **Distribution**

Asteraceae is the largest family of flowering plants comprising about 900 genera and more than 20,000 species. They are distributed throughout the world. In India, about 138 genera and about 708 species are reported.

### **Habit**

Mostly annual or perennial herbs (eg. *Eupatorium odoratum*) or shrubs (eg. *Senecio*) or trees (eg. *Vernonia arborea*). Root and stem commonly contain oil ducts. Many species have colourless latex.

## **Flower**

Very small in size hence referred to as florets, sessile, bracteolate (eg. *Helianthus annuus*) or ebracteolate (eg. *Tridax procumbens*). Pentamerous and epigynous. The disc florets are generally complete, bisexual and actinomorphic, whereas the ray florets are incomplete, pistillate or neutral and zygomorphic.

## **Calyx**

In many species calyx is reduced to numerous hairy appendages called pappus, arranged on top of the ovary. The persistent pappus acts like a parachute and helps in the dispersal of fruit.

## **Corolla**

Petals 5, gamopetalous showing valvate aestivation, regular and tubular in disc florets and irregular and ligulate or bilabiate in ray florets.

## **Androecium**

Stamens 5, epipetalous and alternate the petals. The stamens are **syngenesious** i.e. only anthers are fused into a tube around the style and filaments are free. Anthers are dithecous, basifixed and dehiscent longitudinally.

## **Gynoecium**

Ovary inferior, bicarpellary and syncarpous. Ovary unilocular with a single ovule on basal placentation. Style simple with bifid stigma.

## **Fruit**

Cypsela, single seeded, dry indehiscent fruit developing from an inferior ovary.

## **Seed**

Non-endospermous.



Ligulate (ray) flower typically has formula like

$$\uparrow K_{\infty} C_{(3\vee 5)} A_{(5)} \overline{G_{(2)}}$$

Fruit of aster family is one-seeded **achene** (it is a frequent mistake to call it “seed”). In achene, walls of inferior ovary are tightly fused with seed coat. Achenes frequently bear diverse dispersal structures: trichomes, teeth, hooks *et cetera*.



## **Economic importance**

- .Oil plants Oil extracted from the seeds of *Helianthus annuus* (sunflower) is edible and used as a cooking medium. Oil extracted from the seeds of *Carthamus tinctorius* (safflower) is edible and also used in the manufacture of soap. It contains less amount of cholesterol and therefore it is recommended for heart patients.
- .Medicinal plants The entire plant, *Eclipta prostrata* (Karisalankanni) is used in the preparation of bathing oil and also in the treatment of jaundice, spleen and liver disorders. The drug santonin obtained from the heads of *Artemesia maritima* is used for expelling intestinal round worms.
- .Dye plants A natural red dye obtained from *Carthamus tinctorius* is used for dyeing silks. A yellow dye obtained from the flowers of *Tagetus erecta* is used for dyeing cotton.
- .Pesticides A dried powder called 'Pyrethrum' obtained from the flower heads of *Chrysanthemum cinerarifolium* and *C. coccineum* is used as mosquito repellent.
- .Beverage Powder obtained from the seeds of *Cichorium intybus* (chicory/ kasini keerai) is mixed with coffee powder. Leaves are used to treat several diseases and also used as salad.
- .Ornamental plants *Helianthus annuus* (sunflower), *Tagetus petula* (French marigold), *Calendula officinalis* (pot marigold) and *Zinnia elegans* are grown in gardens for their beautiful flowers.



*Artemisia vulgaris*



*Matricaria chamomilla*



*Calendula officinalis*



*Inula caspica*



*Achillea millefolium*



## Control questions:

1. What is syngenesious stamen?
2. Write the floral formulae for ray and disc florets of Asteraceae.
3. What is pappus?
4. What is santonin?
5. What is pyrethrum?
6. Describe the gynoecium of *Tridax procumbens*.
7. Write the systematic position of Asteraceae.

## Test questions:

*Choose and write the correct options.*

- Vernonia arborea* is a
  - herb
  - shrub
  - tree
  - twiner
- The head is reduced to single flower in
  - Echinops*
  - Launaea*
  - Chrysanthemum*
  - Dahlia*.
- Homogamous head inflorescence is found in
  - Echinops*
  - Launaea*
  - Helianthus*
  - Tridax*.