

PUC I YEAR SEMESTER-II

UNIT–V. PLANT SYSTEMATICS

Module 26 : DESCRIPTION OF SOME IMPORTANT FAMILIES- FABACEAE AND SOLANACEAE

The **Fabaceae** or **Leguminosae**, commonly known as the **legume**, **pea**, or **bean family**, are a large and economically important family of flowering plants. The group is the third-largest land plant family, behind Orchidaceae and Asteraceae. Plants of this family are found throughout the world, growing in many different environments and climates. It includes about 8500 species and about 450 genera. Many of them are important agricultural and food plants including *Glycine max* (soybean), *Phaseolus* (beans), *Pisum sativum* (pea), *Cicer arietinum* (chickpeas).

Vegetative characters:

Habit: Most of them herbs, some are shrubs, trees, weak stemmed twiners or tendril climbers.

Root system: Tap root system, nodular roots which contain Rhizobia the nitrogen fixing bacteria.

Stem: Aerial, prostrate or erect, herbaceous or woody climbers

Leaves: cauline, alternate, stipulate, pulvinous leaf base, petiolate, simple or pinnately compound leaf, venation reticulate.

Floral characters:

Inflorescence: mostly a raceme

Flower: Bracteate, bracteolate or ebracteolate, pedicellate, zygomorphic, complete, bisexual, pentamerous, perigynous, thalamus cup shaped.

Calyx: Sepals five, gamosepalous, imbricate aestivation, odd sepal anterior

Corolla: Petals five, polypetalous, papilionaceous consisting of a large posterior petal (standard), two laterals (wings), two anterior fused petals (keel) enclosing the stamens and pistil, vexillary or descendingly imbricate aestivation.

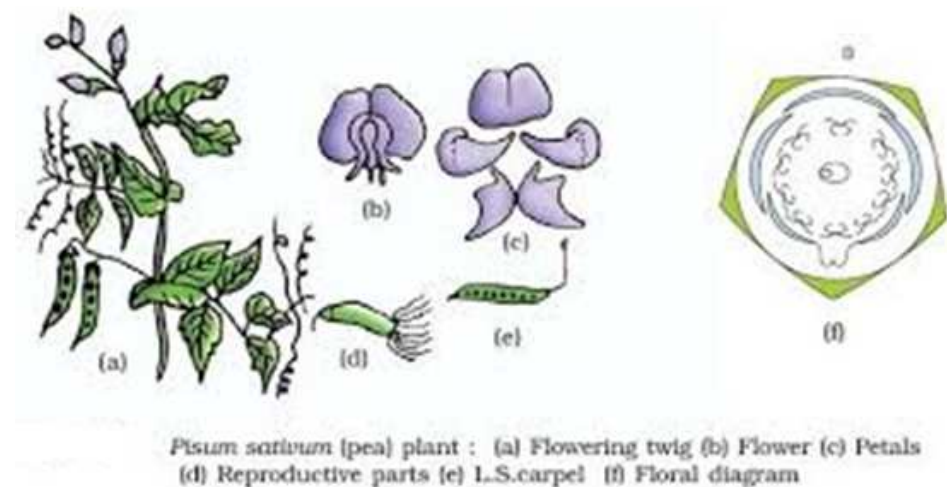
Androecium: Stamens ten, diadelphous ((9) + 1) as in *Pisum* or monadelphous as in *Acacia*, *Crotalaria*, anthers ditheous.

Gynoecium: Monocarpellary, unilocular half superior ovary with many ovules on marginal Placentation, style single, long terminal, stigma simple

Fruit: Mostly legume or pod

Seed: One - many non endospermic, two cotyledons which store mostly proteins, also oil in *Arachis*.

Economic importance: Many plants of this family are good sources of proteins (pulses- red gram, black gram), edible oils (soyabean, groundnut), vegetables (pods of bean, soyabean, seeds of groundnut, and leaves of menthi), timber (red sanders, Indian rose wood) and fiber (sunhemp). Other commercially important products are dyes (*Indigofera tinctoria*), fodder (*Crotalaria*, *Phaseolus*) or green manure (*Sesbania*, *Tephrosia*)



Family: Solanaceae

It is commonly called night shade family derived from Latin (Solari means 'soothing'). The plants of Solanaceae are the third most important plant species economically. They are the most variable of crop species in terms of agricultural utility, as they include the tuber-bearing potato, a number of fruit-bearing vegetables (tomato, eggplant), ornamental plants (petunias, *Nicotiana*, *Cestrum*) with huge flowers (*Brugmansia*) plants with edible leaves (*Solanum aethiopicum*, *S. macrocarpon*), tobacco leaves (*Nicotiana tabacum*) and medicinal plants (eg. *Datura*, *Capsicum*, *Atropa*)

The members are widely distributed in most parts of the world. The family has approximately 90 genera and 2000 species, out of which 60 are found in India.

Distribution – it is distributed in tropics, subtropics and even temperate zones.

- a. **Habit** – Erect or climbing, herbs or shrubs or small trees.
- b. **Vegetative characters** – Roots – taproot or adventitious roots.
- c. **Stem** – Aerial, erect or climbing types, herbaceous, rarely woody, cylindrical, branched, solid or hollow, hairy or glabrous. The aerial parts have prickles in a lot of the species or at least they are covered with hairs. Usually with **bicollateral vascular bundles**.

- d. **Leaf** – Usually simple, rarely pinnately compound, exstipulate, reticulate venation.

e. **Floral characters**

Inflorescence – Cymose (helicoid cyme) or solitary, axillary.

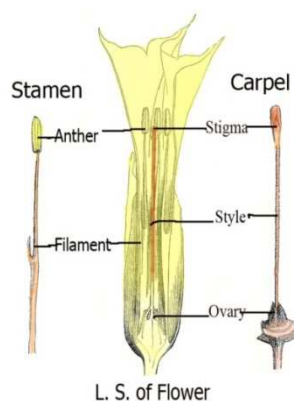


Solitary (*Datura*)



Axillary inflorescence in *Solanum* species

Flower – Flowers are typically conical or funnel shaped, pedicillate, actinomorphic, complete, hermaphrodite, pentamerous, bracteate or ebracteate and **hypogynous**.



Calyx – Five sepals, gamosepalous, tubular or companulate, green or coloured, hairy, persistent.

Corolla – Five petals, gamopetalous, tubular or infundibuliform, valvate or imbricate aestivation is seen.

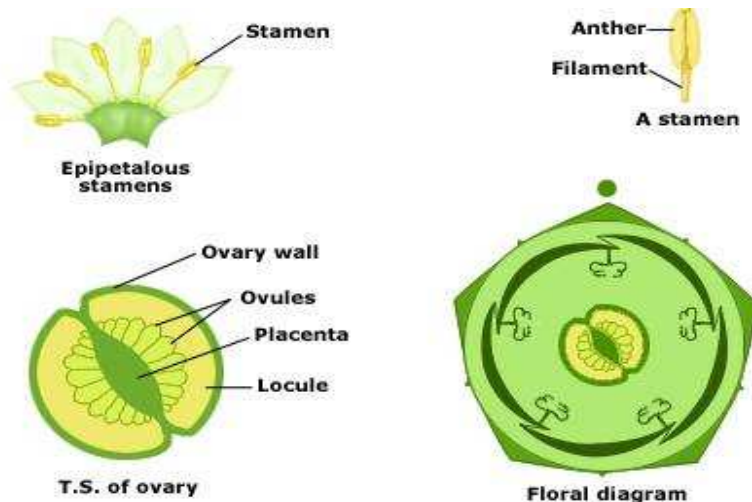
Androecium – Five epipetalous stamens, **adnate** to corolla tube, filaments equal in size, anthers introse, basifixed or dorsifixed.

Gynoecium – Bicarpellary, **syncarpous**, **superior ovary**, obliquely placed, ovules on axile placentation, single style and stigma bifid or capitate.

Fruit – berry or capsule.

Seed: Many, **Endospermic.**

Floral formula - $\oplus \text{ } \text{♀} \text{ } K_{(5)} \text{ } \overbrace{C_{(5)}} \text{ } A_5 \text{ } \underline{G}_{(2)}$



Economic importance:

They are utilized by human beings as food (mostly as vegetables), spice medicines and ornamentals.

- i. It provides food, medicine and ornamental plants.
- ii. *Solanum tuberosum* (potato), *Solanum melongena* (brinjal), *Capsicum frutescens* (chillies), *Lycopersicon esculentum* (tomato) are used as vegetables.
- iii. *Datura*, *Hyoscyamus niger* (henbane), *Solanum xanthocarpum* (Kateli), *Withania somnifera* (Ashwagandha) are used for medicinal purpose.
- iv. Belladonna (*Atropa belladonna*) contains atropine alkaloid and is used in eye testing and plaster.
- v. *Nicotiana tabacum* (tobacco) is used as **narcotic** and for making bidis and cigarettes and also for chewing. Nicotine is also used as an insecticide.

- vi. *Cestrum nocturnum* (raat-ki-rani), *Petunia*, *Schizanthus* are grown as garden plants.

Check points

- The Fabaceae or Leguminosae, commonly known as the legume, pea, or bean family, are a large and economically important family of flowering plants.
- Inflorescence is mostly a raceme
- Flowers are zygomorphic, thalamus cup shaped.
- Corolla papilionaceous
- Stamens ten, diadelphous ((9) + 1) as in *Pisum* or monadelphous as in *Acacia*, *Crotalaria*.
- Gynoecium- Monocarpellary, unilocular half superior ovary with many ovules on marginal Placentation.
- Fruit mostly legume or pod
- Solanaceae is commonly called night shade family.
- The plants of Solanaceae are the third most important plant species economically.
- The members are widely distributed in most parts of the world. The family has approximately 90 genera and 2000 species.
- Inflorescence – Cymose (helicoid cyme) or solitary, axillary. Flowers are typically conical or funnel shaped.
- Pentamerous and hypogynous flowers.
- Presence of persistent calyx

- Epipetalous stamens, gynoecium bicarpellary, syncarpous, superior ovary, obliquely placed carpels.
- Fruit is a berry or a capsule.
- They are utilized by human beings as food (mostly as vegetables), spice medicines and ornamentals.

Short answer questions:

1. What is papilionaceous corolla?
2. Give economic importance of the family fabaceae?
3. Write the floral formula for complete, actinomorphic, bisexual, five free sepals, five free petals, five epipetalous stamens, bicarpellary, syncarpous, superior ovary.
4. Give an account of the floral characters of the family Solanaceae.
5. Write an account of the economic importance of the plants belonging to the family Solanaceae.
6. Describe the essential organs of flower in Solanaceae.

Long answer questions:

1. Describe the characters of family Fabaceae?
2. Describe the family characters of Solanaceae with well labeled diagrams.

MCQS

1. _____ aestivation is found in family fabaceae
 - a. Valvate
 - b. Imbricate**
 - c. Twisted
 - d. None of the above
2. Dye is obtained from

- a. Glycine*
 - b. Arachis*
 - c. Indigofera***
 - d. Pisum*
3. In Solanaceae the aestivation is
- a. Descending Imbricate
 - b. Valvate**
 - c. Quincuncial
 - d. Twisted
4. The gynoecium in the family Solanaceae is
- a. Tricarpellary
 - b. Bicarpellary**
 - c. Unicarpellary
 - d. Multicarpellary
5. _____ placentation is found in Solanaceae
- a. Axile**
 - b. Basal
 - c. Parietal
 - d. Marginal
6. Economically important plant belonging to the family Solanaceae is
- a. *Ashwagandha***
 - b. *Asparagus*
 - c. *Aloe*
 - d. *Gloriosa*

7. Which one of the following statement is correct with reference to the vegetative characters of family solanaceae
- a. Fibrous Roots and always with sessile leaves
 - b. Exstipulate leaves and bicollateral vascular bundles**
 - c. Stipulate leaves and bicollateral vascular bundles
 - d. Taproot system and compound leaves
8. The anthers in *Solanum tuberosum* are
- a. Sterile
 - b. Extrose and versatile
 - c. Introse and versatile
 - d. Introse and basifixed**
 - e. Extrose and dorsifixed
9. The essential organs of tomato flowers shows
- a. Monocarpellary condition and indefinite number of stamens
 - b. Bicarpellary, syncarpous condition and five epipetalous stamens**
 - c. Bifid stigma and five free stamens
 - d. Bifid stigma with two styles and five epipetalous stamens
10. The petals and sepals in Solanaceae plants are
- a. United**
 - b. Free
 - c. Reduced
 - d. Undifferentiated