

MORPHOLOGY OF FLOWERING PLANTS

PREPARED BY
D.KANAKA LAKSHMI
PGT BIOLOGY
AECS KAIGA

**THIS MODULE IS PREPARED
ACCORDING TO THE REVISED
SYLLABUS FOR THE YEAR 2020-21**

THE INFLORESCENCE

- Flowers may be produced singly or in groups
- Single- Solitary flower
- Group- Inflorescence
- In inf. definite pattern on reproductive branch called peduncle
- A natural group of flowers produced on a peduncle is called inflorescence

THE INFLORESCENCE

A flower is a modified shoot wherein the shoot apical meristem changes to floral meristem. Internodes do not elongate and the axis gets condensed. The apex produces different kinds of floral appendages laterally at successive nodes instead of leaves. When a shoot tip transforms into a flower, it is always solitary. The arrangement of flowers on the floral axis is termed as **inflorescence**. Depending on whether the apex gets converted into a flower or continues to grow, two major types of inflorescences are defined – racemose and cymose. In racemose type of inflorescences the main axis continues to grow, the flowers are borne laterally in an acropetal succession.

In cymose type of inflorescence the main axis terminates in a flower, hence is limited in growth. The flowers are borne in a basipetal order.



Cymose Inflorescence



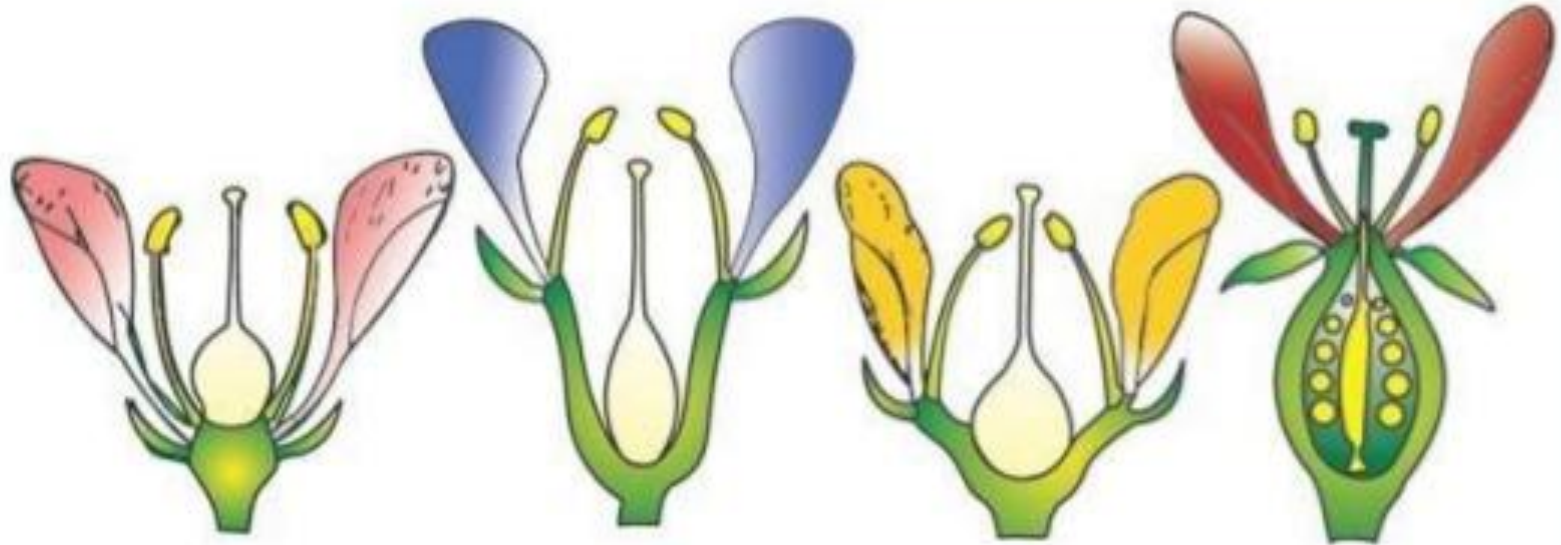
Racemose Inflorescence

THE FLOWER

The flower is the reproductive unit in the angiosperms. It is meant for sexual reproduction. A typical flower has four different kinds of whorls arranged successively on the swollen end of the stalk or pedicel, called thalamus or receptacle. These are calyx, corolla, androecium and gynoecium. Calyx and corolla are accessory organs, while androecium and gynoecium are reproductive organs. In some flowers like lily, the calyx and corolla are not distinct and are termed as perianth. When a flower has both androecium and gynoecium, it is bisexual. A flower having either only stamens or only carpels is unisexual.

In **symmetry**, the flower may be actinomorphic (radial symmetry) or zygomorphic (bilateral symmetry). When a flower can be divided into two equal radial halves in any radial plane passing through the centre, it is said to be actinomorphic, e.g., mustard, datura, chilly. When it can be divided into two similar halves only in one particular vertical plane, it is zygomorphic, e.g., pea, gulmohur, bean, Cassia. A flower is asymmetric (irregular) if it cannot be divided into two similar halves by any vertical plane passing through the centre, as in canna.

A flower may be trimerous, tetramerous or pentamerous when the floral appendages are in multiple of 3, 4 or 5, respectively. Flowers with bracts – reduced leaf found at the base of the pedicel – are called bracteate and those without bracts, ebracteate



**Position of floral parts on
Thalamus : (a) Hypogynous (b) and
(c) Perigynous (d) Epigynous**

Parts of Flower.

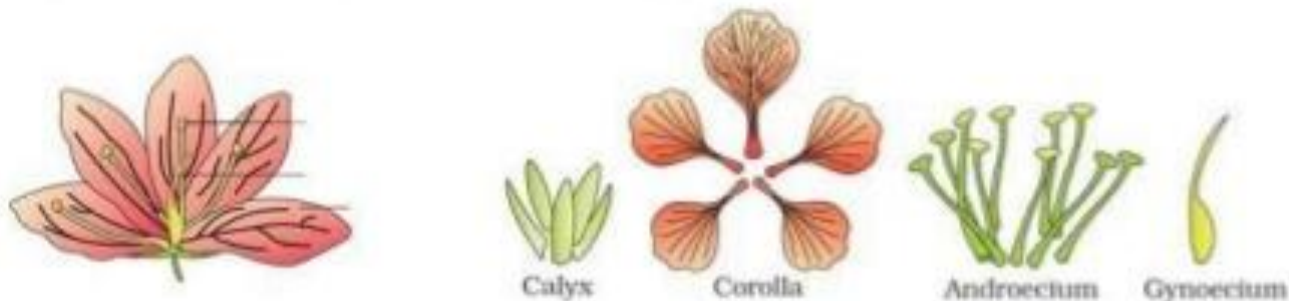
Each flower normally has four floral whorls, viz., calyx, corolla, androecium and gynoecium.

CALYX

The calyx is the outermost whorl of the flower and the members are called sepals. Generally, sepals are green, leaf like and protect the flower in the bud stage. The calyx may be gamosepalous (sepals united) or polysepalous (sepals free).

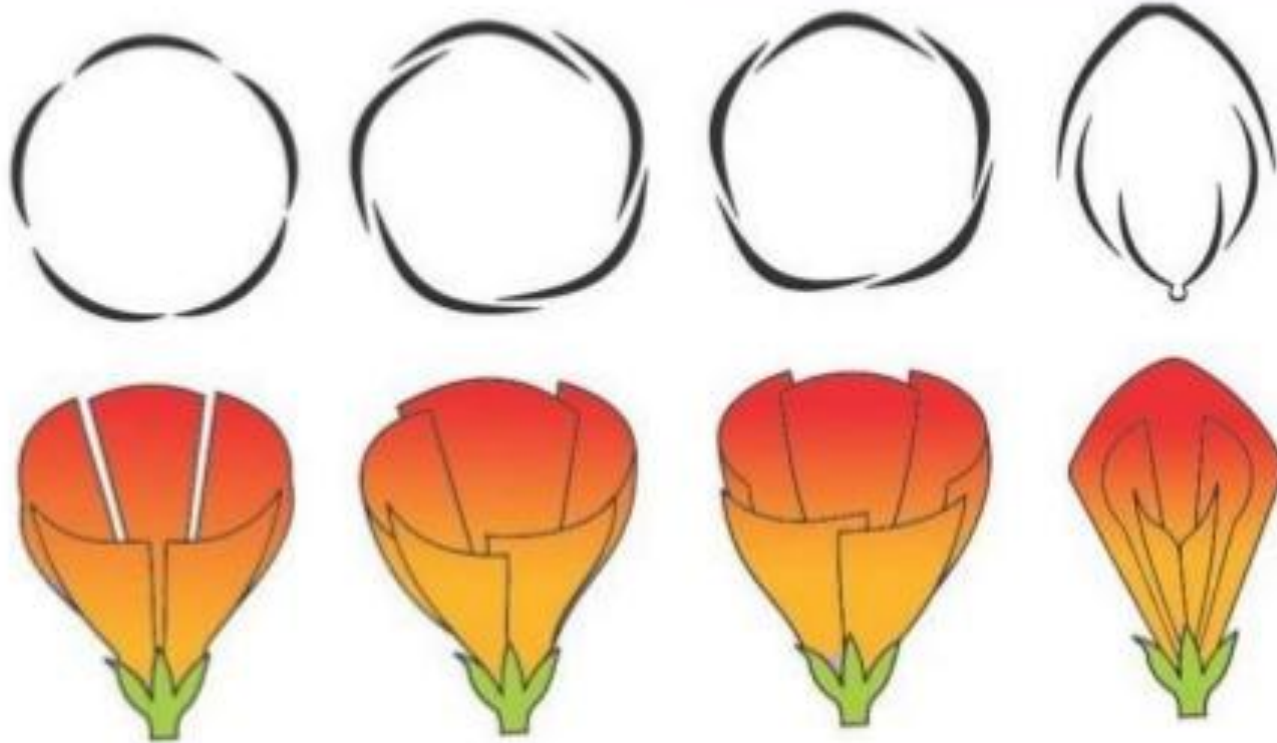
COROLLA

Corolla is composed of petals. Petals are usually brightly coloured to attract insects for pollination. Like calyx, corolla may be also united gamopetalous (petals united) or polypetalous (petals free). The shape and color of corolla vary greatly in plants. Corolla may be tubular, bell-shaped, funnel-shaped or wheel-shaped.



Aestivation

- The mode of arrangement of sepals or petals in floral bud with respect to the other members of the same whorl is known as aestivation. The main types of aestivation are valvate, twisted, imbricate and vexillary . When sepals or petals in a whorl just touch one another at the margin, without overlapping, as in Calotropis, it is said to be valvate. If one margin of the appendage overlaps that of the next one and so on as in china rose, lady's finger and cotton, it is called twisted. If the margins of sepals or petals overlap one another but not in any particular direction as in Cassia and gulmohur, the aestivation is called imbricate. In pea and bean flowers, there are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel); this type of aestivation is known as vexillary or papilionaceous.



**Types of aestivation in corolla : (a)
Valvate (b) Twisted (c) Imbricate
(d) Vexillary**

Solanaceae:
The Nightshade family



Classification

Kingdom: Plantae

Class: Magnoliopsida

Order: Asteridales

Family: Solanaceae

Genus: *Solanum*



General Information

Genera: About 95

Species: Over 2800

Distribution:

Temperate and Tropical;
In Pakistan, this family is
represented by 21 genera
and 70 species.

Greatest diversity found
in Central and South
America.



Habit:

Herbs

Shrubs

Trees

Lianas (woody vines)



Roots:

Tap root is fibrous
or tuberous



Stem:

Aerial

Erect

Spinous

Herbaceous

Woody

Cylindrical

Branched

Tuber.



Leaves:

Pinnately veined

Alternate

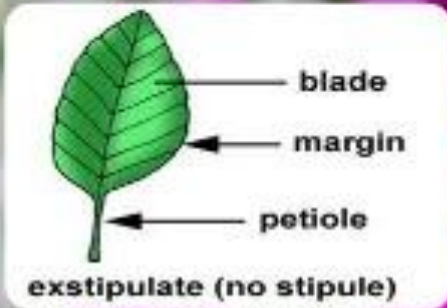
Simple

Exstipulate

Often hairy

Unicostate

Reticulate



Inflorescences:

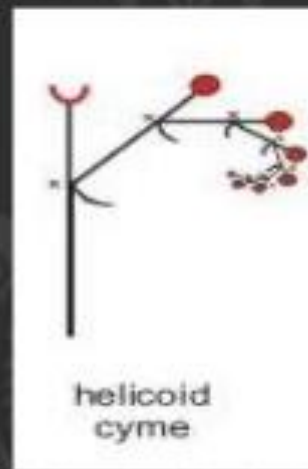
Axillary cyme



Scorpioid cyme



Helicoid cyme



Umbellate cyme

Petunia
(cyme)



Flowers:

Bractiate,

Ebractiate,

Pedicellate,

Dichlamydeous,

Pentamerous,

Complete,

Actinomorphic



Calyx

Sepals 5 Green

Gamosepalous

Tubular

valvate aestivation

imbricate aestivation



Corola

Petals 5,

Gamopetalous

Funnel shaped

Rotate

Tubular

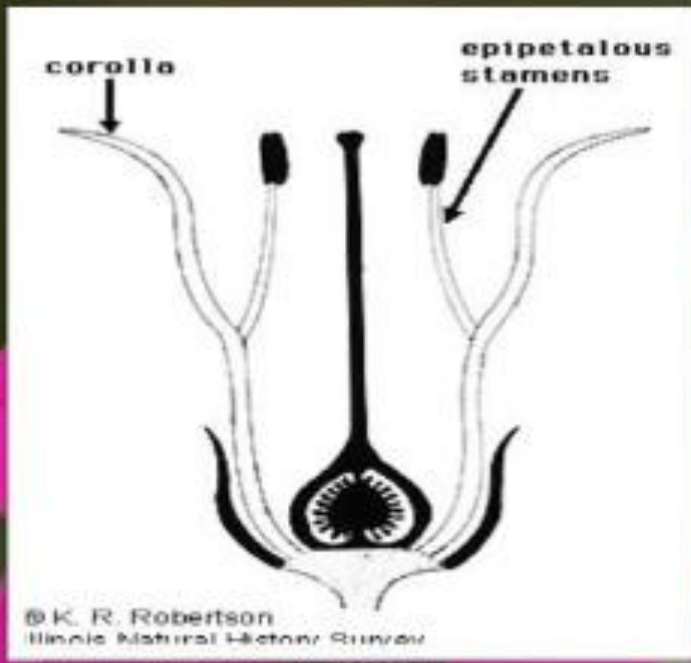
Usually plicate



Androecium

Stamens 5,

epipetalous, alternate with the petals, not equal in length filaments are inserted in the middle or basal region of corolla tube.



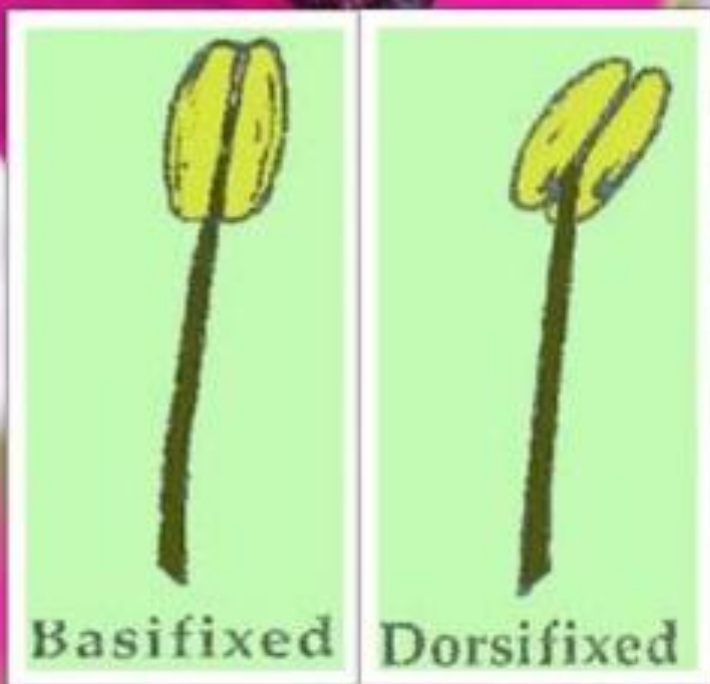
Anthers

Dithecous: Bilobed

Basifixed

Dorsifixed

Dehiscing longitudinally (*Solanum nigrum*).



Gynoecium

Ovary superior

Bicarpellary

Syncarpous

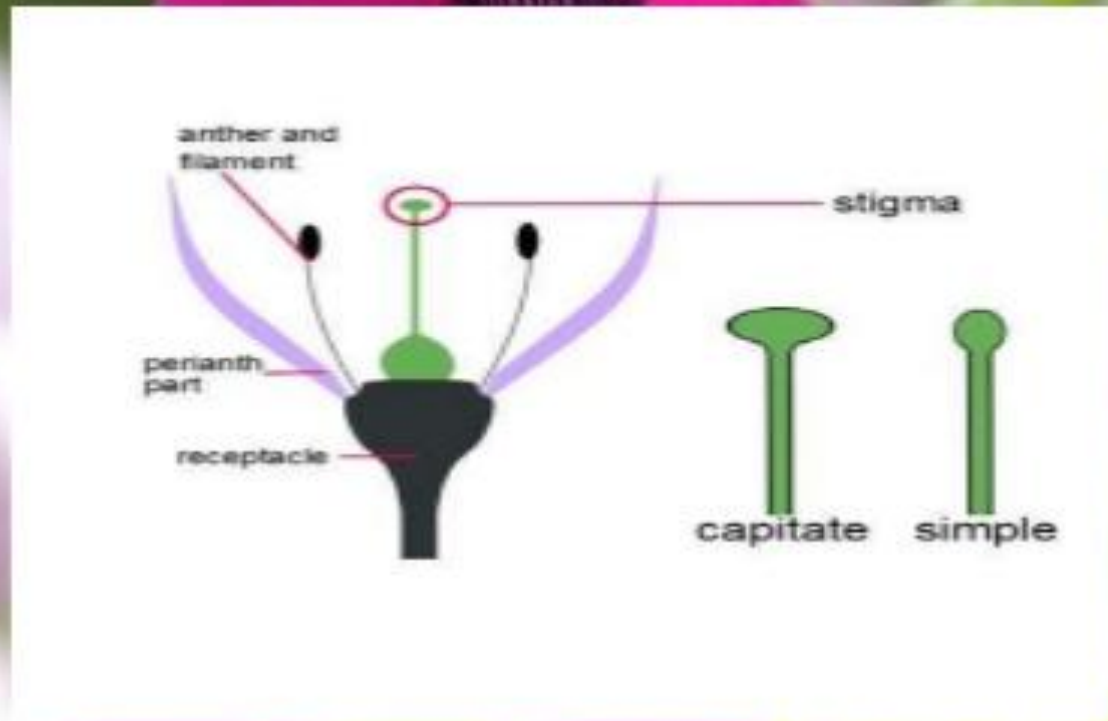
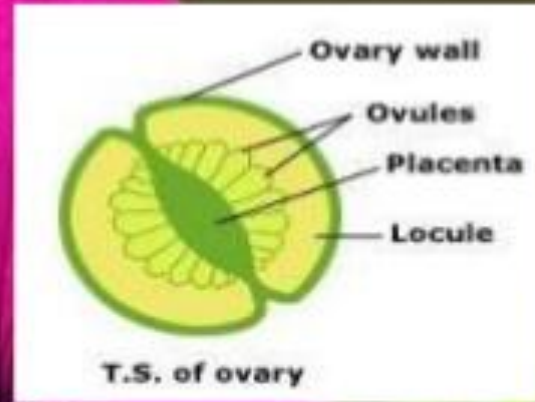
Ovary bilocular

Style

Simple

Undivided.

Stigma Capitate.



Fruit:

A berry or septicidal capsule.

*In Lycopersicon esculentum, & Solanum
Melongena* the fruit is a berry.

In species of *Datura* and *Petunia*, the fruit is
a capsule.



Seed:

Endospermous

Seeds of Solanum malongena

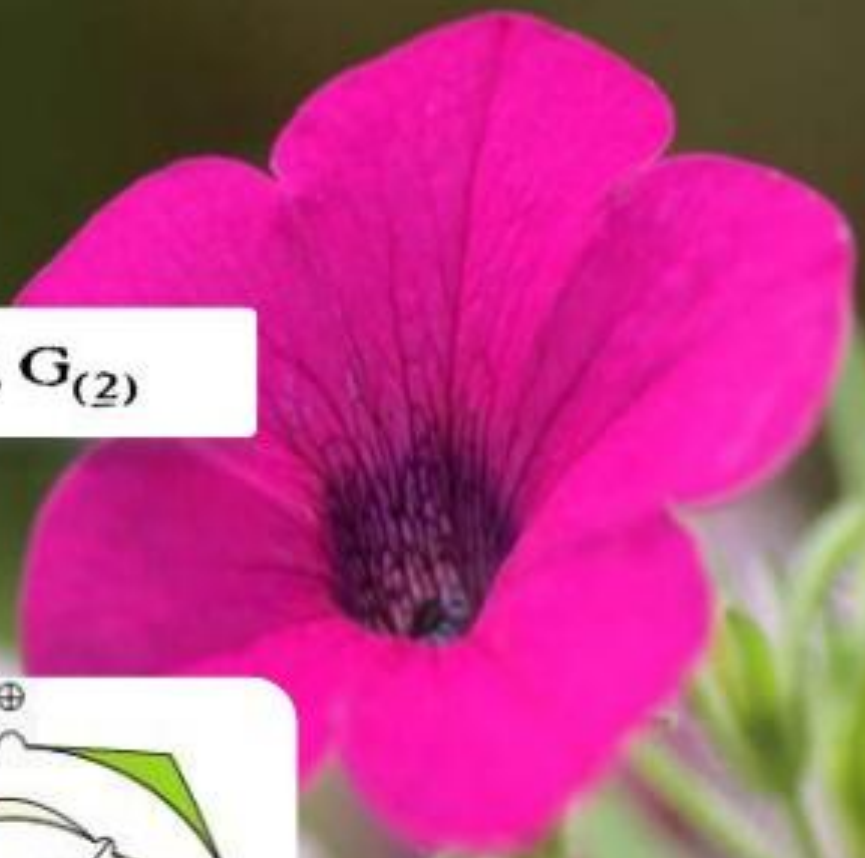
Seeds of Datura



Floral Formula

$\oplus \quad \text{♀} \quad K \ 5, \ \overline{C(5)}, \ A5, \ G_{(2)}$

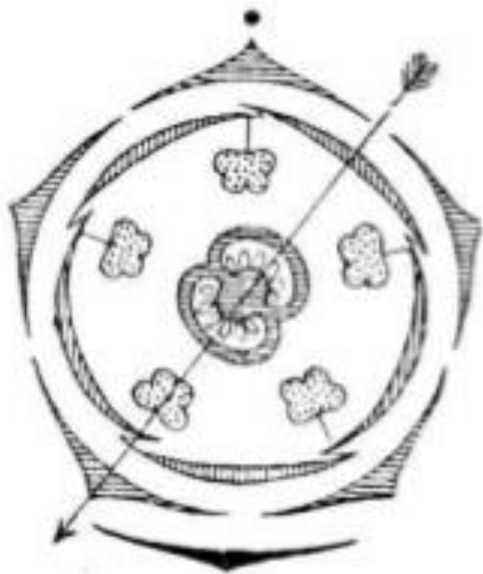
Floral Diagram



Solanaceae

- Floral formula:
- Floral diagram:

* ♀ $K_{(5)} \overbrace{C_{(5)}} A_5 \underline{G}_{(2)}$



Economic Importance:

- Economic importance of Solanaceae:
- Source of food (tomato, brinjal, potato)
- Spice (chilly)
- Medicine (belladonna, ashwagandha)



Ashwagandha
Powder

Economic Importance:

- Fumigatory (tobacco)
- Ornamentals (Petunia)



Liliaceae

- Liliaceae is the family of around 2500 species of herbaceous monocots and is also known as the 'lily family'



Vegetative Characters

- Perennial herbs with underground bulbs/corms/rhizomes
- **Leaves:** mostly basal, alternate, simple, linear, exstipulate with parallel venation

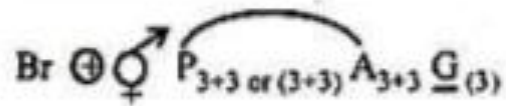
Floral characters

- **Inflorescence:** Cymose/solitary, umbellate clusters
- **Flower:** Bracteate, bisexual, actinomorphic
- **Perianth:** Tepal six (3+3), often united into tube, valvate aestivation
- **Androecium:** Six stamens in two whorls (3+3), often epiphyllous
- **Gynoecium:** Tricarpellary, syncarpous, ovary superior, trilocular with many ovules, axile placentation
- **Fruit:** Berry or often Capsule
- **Seed:** Endospermic

Floral characters

- Floral formula:
- Floral diagram

Floral formula:



Floral diagram:



Economic Importance:

- Source of medicine (Aloe)
- Ornamentals (tulip, Gloriosa)



Economic Importance

- Vegetables (*Asparagus*)
- Colchicine (*Colchicum autumnale*)
- The bulb-like corms of *Colchicum autumnale* contain colchicine, a useful drug approved by the US FDA for the treatment of gout and familial Mediterranean fever



THANK YOU