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Theme: Diversity Living Things

S1 New Curriculum Biology-Chapter 3 – Flowering plants



Flowering plants/Angiosperm

These are plants that bear flowers and fruits, and their seeds are enclosed within a fruit. They are classified as dicotyledonous plants e.g. beans and monocotyledonous plants e.g. Maize



Bean plant



Maize plant

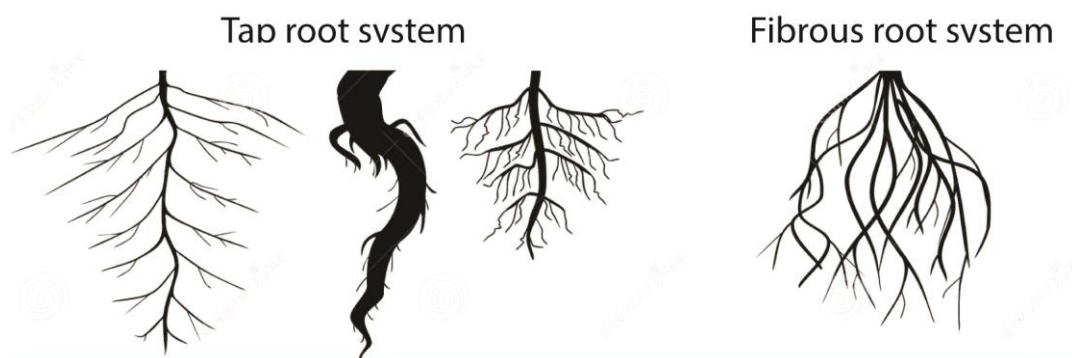
Differences between monocotyledonous and dicotyledonous plants

Monocotyledonous plants	Dicotyledonous plants
Seeds have a single cotyledon.	Seeds have two cotyledons
Adventitious root system present.	Tap root system present
Leaves have parallel venation.	Leaves have net venation or reticulate venation.
Flowers usually incomplete and trimerous (Floral parts are in the number of threes).	Flowers usually complete and pentamerous (floral parts in the number of fives).
Vascular bundles in stem are numerous and scattered.	Vascular bundles in stem are fewer and arranged in circles or rings.
No cambium, no secondary growth in stem.	Cambium is present, secondary growth occurs.
Stem usually hollow.	Stem usually solid
Seed germination normally hypogeal	Seed germination either hypogeal or epigeal.

Parts of the flowering plants

Root system

Roots are the underground parts of plants that anchor them in the soil and absorb water and nutrients. The root system is either a fibrous root system in monocots or tap root system in dicots.



A tap root system consists of a main root (tap root) thickening in size downwards from which several secondary (lateral) roots branch at different points

A fibrous root system consists of several secondary roots of almost equal size and length, originating from the same point at the base of the stem as shown above.

Primary functions of roots

- (a) Absorption: Roots absorb water and mineral salts from the soil, which are essential for plant growth.
- (b) Anchorage: They anchor the plant firmly in the ground providing stability
- (c) They transport water and mineral salts to the stem

Functions of modified roots

Storage: roots of sweet potatoes, carrot, sugar beets and cassava are used for storage of food nutrients.

Examples of storage roots



Sweet potatoes



Carrots



Sugar beets



Cassava

Extra support: buttress roots, prop roots, clasp roots provide extra support to plants such as maize and big trees.

Examples of roots for support



Buttress roots



Prop roots



Clasping roots

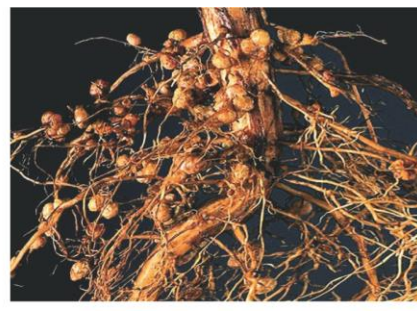


Stilt roots

Breathing root: They allow plants in water logged places such as mangrove to respire.



Breathing roots of mangrove forests



Roots of leguminous plant

Leguminous roots contain root nodules where bacteria that fix nitrogen are sheltered.

Reproduction: sweet potato roots and others are used for reproduction

Stem

A stem is the part of a plant that connects the roots to the leaves, flowers, and fruits.

Primary functions of a stem

- Hold leaves in such a way as to receive sunlight.
- Hold the flowers in space to enable easy pollination by wind or animals
- Conduct water and mineral salts from the roots to the leaves
- Distributes manufactured food in the plant.

Modified stems



Irish potatoes for vegetative reproduction



Sugarcane for food storage



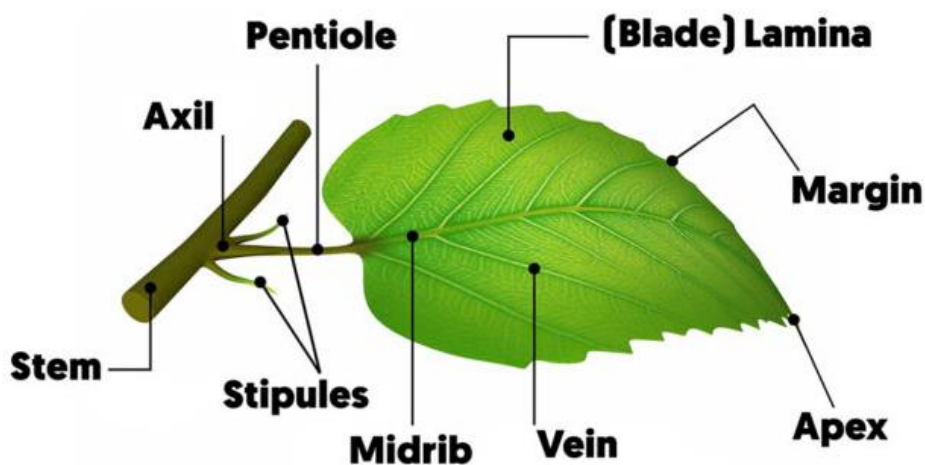
Stems with thorns for protection

Function of modified stems

- Storage e.g. Irish potatoes, sugar cane, cactus. These are swollen to provide storage space
- Vegetative reproduction: e.g. Irish potatoes, sugar cane, ginger rhizome
- Protection: stems bear a hard epidermis and/or thorns for storage

Leaves

Leaves are structures attached to the stem subtended by an axillary bud/stipule

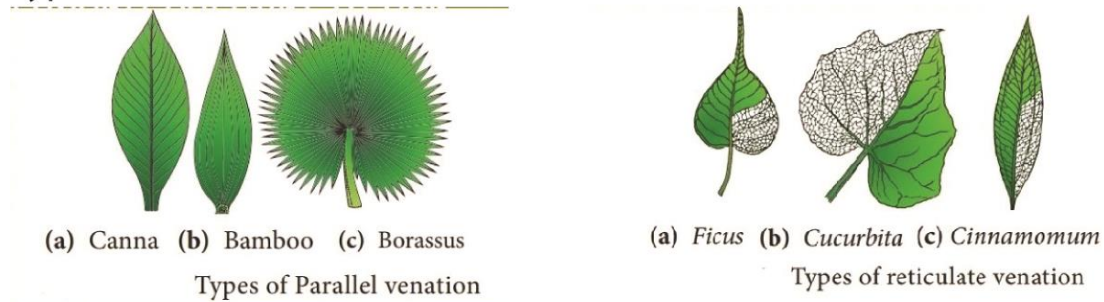


Leaf venation

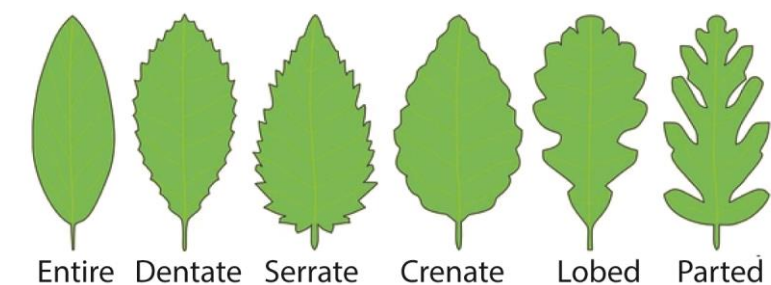
Leaf venation refers to the pattern of veins in a leaf. These veins transport water, nutrients, and food throughout the leaf and provide structural support. There are two main types:

- **Parallel venation:** Veins run parallel to each other from the base to the tip, like in grasses and monocots (e.g., maize).
- **Reticulate venation:** Veins form a web-like network, commonly found in dicot plants (e.g., mango, guava).

Types of leaf venation



Leaf margins



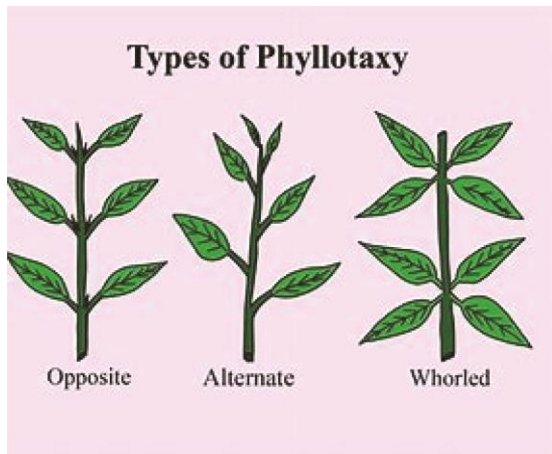
Leaf margins refer to the edges of a leaf, and they come in various types. Here are some common ones:

1. **Entire** – Smooth edges without any teeth or lobes.
2. **Dentate** – Tooth-like edges with outward-pointing teeth.
3. **Serrate** – Saw-like edges with sharp teeth pointing forward.
4. **Crenate** – Rounded teeth along the margin.
5. **Lobed** – Deep indentations that create lobes, like oak leaves.
6. **Undulate** – Wavy edges that curve up and down.
7. **Fringed** – Hair-like structures along the margin.
8. **Revolute** - Edges curled downward.

Arrangement of leaves on a stem

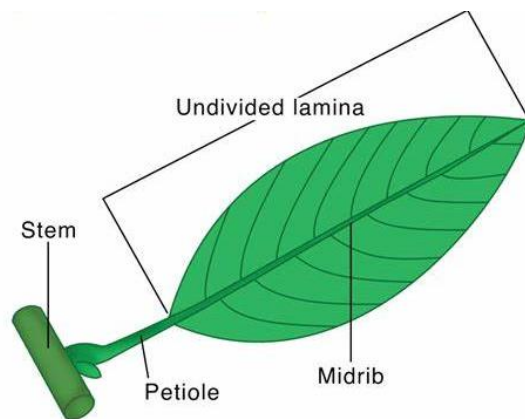
The arrangement of leaves on a stem is called **phyllotaxy**. There are three main types:

1. **Alternate** – A single leaf grows at each node in an alternating pattern along the stem.
2. **Opposite** – Two leaves grow at the same node but on opposite sides of the stem.
3. **Whorled** – Three or more leaves grow from a single node, forming a circular pattern around the stem.



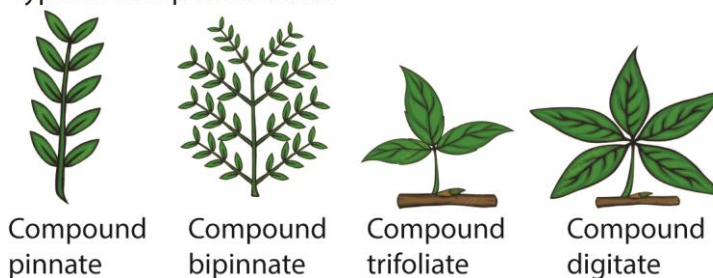
Shapes of leaves

1. Simple leaves have only one leaf blade.



2. Compound leaves have their lamina subdivided into leaflets as shown below

Types of compound leaves



Functions of leaves

Their main functions include:

- **Photosynthesis:** They capture sunlight and convert it into food for the plant. This process produces oxygen, which we breathe.
- **Gas exchange:** Leaves take in carbon dioxide and release oxygen through tiny openings called stomata.
- **Transpiration:** They regulate water loss, helping to cool the plant and maintain moisture balance.
- **Storage:** Some leaves store food and water, like in succulents.
- **Protection:** Certain plants have modified leaves, like thorns, to deter animals.

Modified leaves



Leaf modified for vegetative reproduction



Thorny leaf for protection



Fleshy leaves for water storage



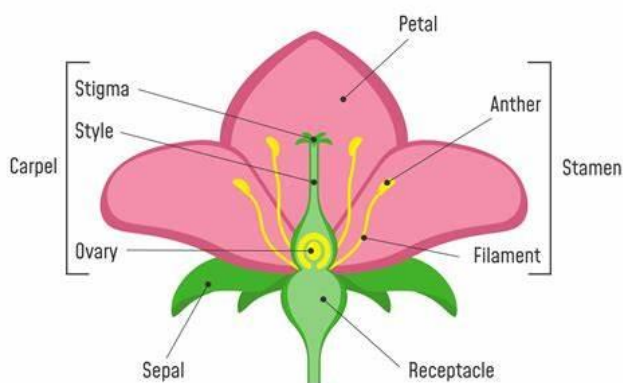
Venus fly trap leaves trap insects to obtain nitrogen



Colored leaves of bougainville attract pollinators

Flowers

A flower is the sexual reproductive structure of flowering plants.



Basic Parts of a Flower:

1. **Petals** – Brightly colored structures that attract pollinators.
2. **Sepals** – Protective outer leaves that encase the flower bud.
3. **Stamens** – The male reproductive organs, consisting of:
 - **Anther** (produces pollen)
 - **Filament** (supports the anther)
4. **Carpels/Pistils** – The female reproductive organs, including:
 - **Stigma** (receives pollen)
 - **Style** (connects stigma to ovary)
 - **Ovary** (contains ovules that develop into seeds)

Fruit: is a fertilized ovary

Seed: is a fertilized ovule

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