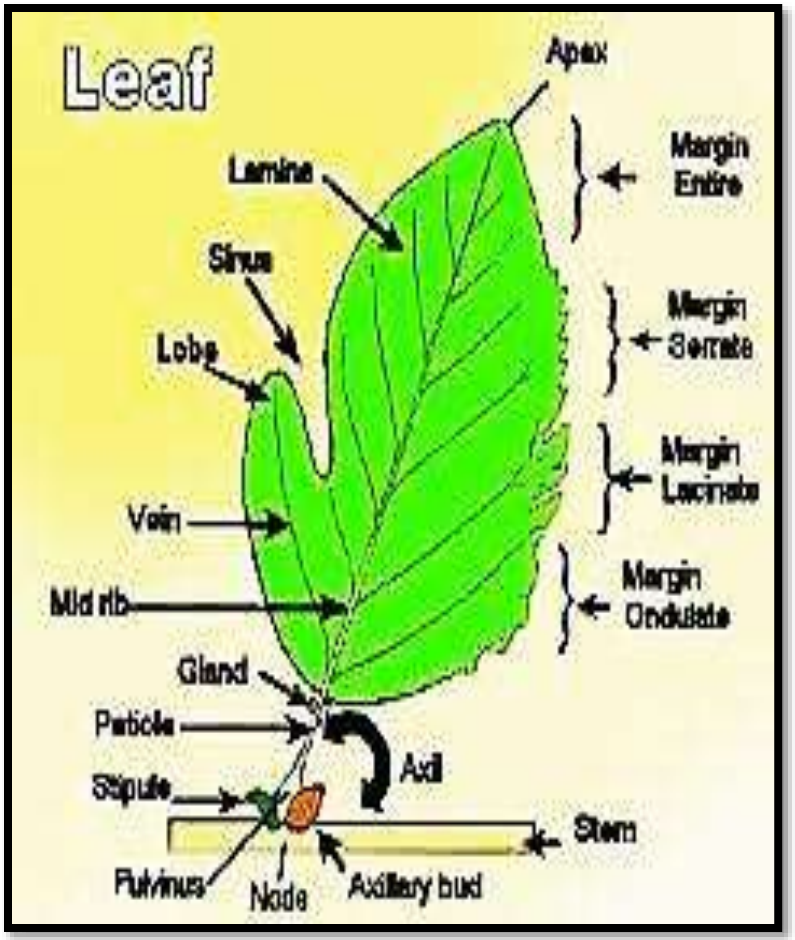
Morphology of Leaf

A **dorsi-ventrally** compressed, **lateral appendage** of stem produced at the **nodes** and is specialized to perform photosynthesis

CHARACTERISTICS OF LEAF:

- Leaf is a **thin, expanded, green** structure.
- The green colour of the leaf is due to the presence of chlorophyll pigment.
- It is **exogenous** in origin.
- It is borne on the stem **at the node.**
- An **axillary bud** is often present in the **axil** of each leaf.
- It has **limited growth.**
- It does not possess apical bud or a regular growing point.



Morphology of Leaf

PARTS OF A TYPICAL LEAF :

LEAF BASE OR HYPOPODIUM:

- The part of leaf **attached** to the stem or branch is known as leaf base.
- It may assume different shapes in different plants.
- In some leguminous plants, the leaf blade may become swollen which is called **pulvinus**.
- In monocots, the leaf base expands into a sheath **covering** the stem partially or completely.
- Leaves of some plants possess a pair of lateral outgrowths at the base, on either sides of axillary bud. These outgrowths are called **stipules** and such leaves are called **stipulate** leaves.
- The leaves without stipules are called **ex-stipulate** leaves. Stipules are usually **green**.
- The main functions of stipules are to **protect** the **bud** and carry out **photosynthesis**.

PULVINUS

SHEATH

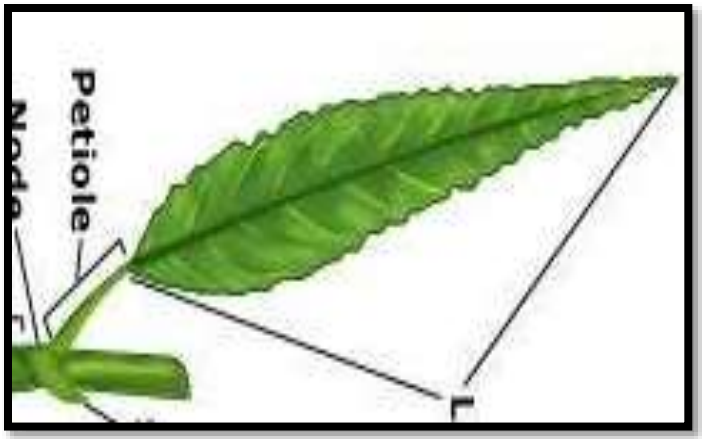
STIPULES

Morphology of Leaf

PARTS OF A TYPICAL LEAF :

PETIOLE OR MESOPODIUM:

- Petiole is the part of leaf connecting the **lamina** with the branch or stem.
- Leaves that possess petiole are called **petiolate** and leaves without petiole are called non-petiolate or **sessile** leaves.
- Petiole is usually **cylindrical**, but may be hollow *(Papaya)*, tubular or flattened.
- Function of petiole is to **raise** the lamina to expose it to more **light** and **air** and to help in conduction.

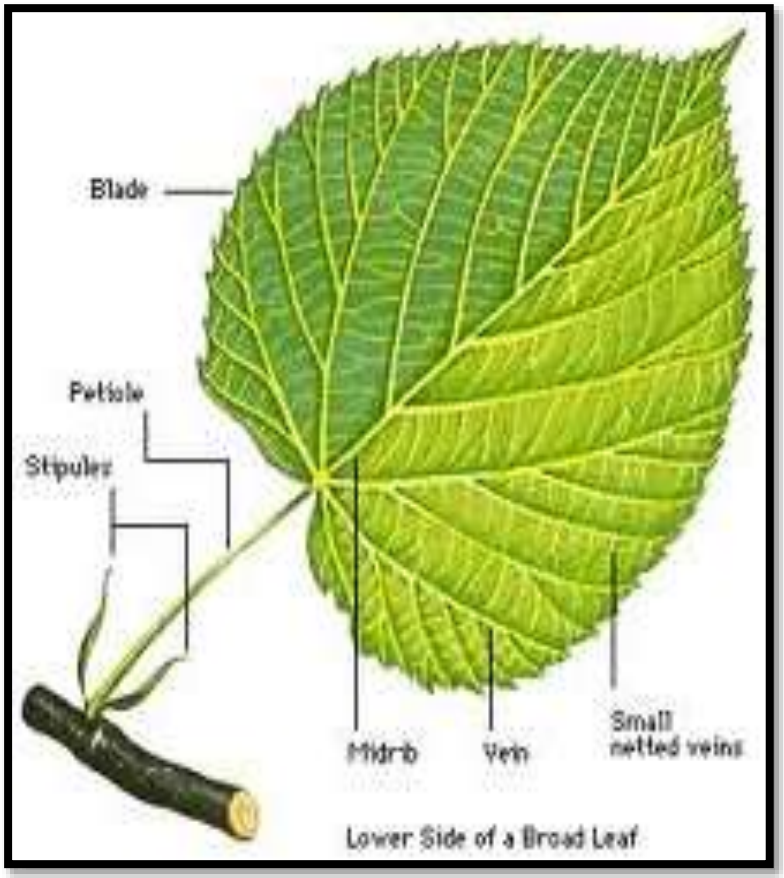


Morphology of Leaf

PARTS OF A TYPICAL LEAF :

LAMINA OR EPIPODIUM:

- This is the **largest**, most important, **green** and flattened part of the leaf.
- It plays a vital role in **photosynthesis, gaseous exchange** and **transpiration.**
- The leaf is known as **dorsiventral** when its ventral surface is structurally different from dorsal surface, e.g. *dicotyledonous* leaves.
- The leaves having both similar surfaces are called **isobilateral**. Such leaves are found in *monocot* plants



Morphology of Leaf

LEAF VENATION :

- The **arrangement of veins and veinlets** in the lamina is known as venation.
- The veins are in fact conducting strands of lamina.
- They are concerned with the **conduction** of water, mineral salts and food and form the **structural framework** of the lamina.

RETICULATE

PARALLEL

Morphology of Leaf

RETICULATE VENATION:

- When the veins and veinlets form a **network**, it is called reticulate venation.
- Here the midrib is **centrally** placed and veins and veinlets remain distributed **laterally**.
- It is found in *dicotyledonous* plants.

On the basis of number of mid-veins,

1. **Unicostate** - with a *single* mid-vein *(e.g. Mango)*

2. **Multicostate** - with *two* or more prominent veins *(e.g. Zizyphus)*.
   It may be *convergent* or *divergent*.

Morphology of Leaf

PARALLEL VENATION:

- In this type of venation, **veins** in lamina run almost **parallel** to one another.
- It is found commonly in *monocotyledonous* plants.
- It is of the following two types:

1. **Unicostate** e.g., *Banana, Canna.*
2. **Multicostate** e.g., *Grass, rice, bamboo,* etc

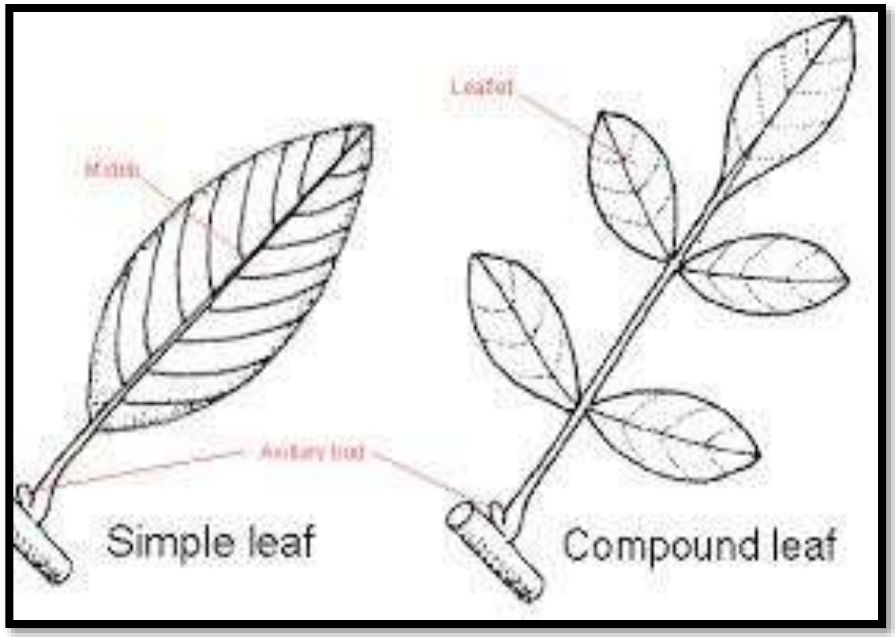
Morphology of Leaf

SIMPLE LEAF :

- Simple leaves are those in which **single** leaf blade or **lamina** is present,
- e.g., *Mango, Peepal, Papaya, etc.*

COMPOUND LEAF :

- Compound leaves are those in which the leaf blade or lamina is divided into number of segments known as **leaflets** or **pinnae**.
- The leaflets never bear axillary buds in their axil.



Morphology of Leaf

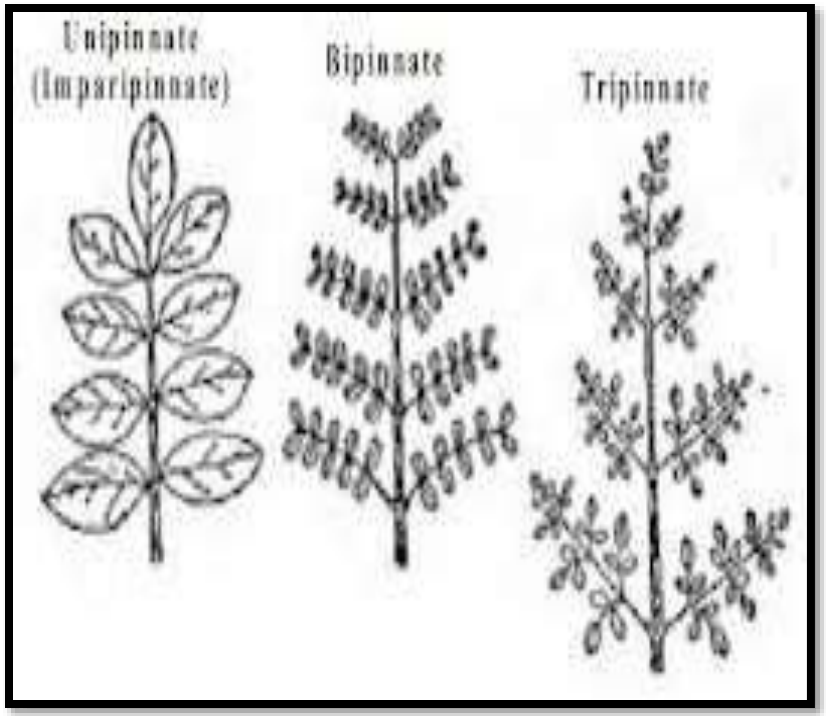
COMPOUND LEAF :

a) Pinnately compound leaves:

- In this type the leaflets are present laterally on a common axis called **rachis**, which represents the **midrib** of the leaf
- *(e.g. Gold mohur, Cassia)*

- There are of four kinds of pinnately compound leaves as

i) Unipinnate
ii) Bipinnate
iii) Tripinnate
iv) Decompound



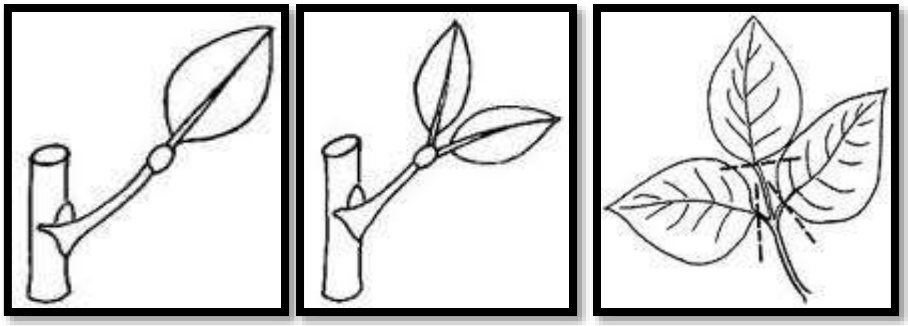
Morphology of Leaf

COMPOUND LEAF :

b) Palmately compound leaves:

- All the **leaflets** of the palmately compound leaves are attached at a **common point**, i.e. at the tip of petiole, like fingers of the palm.
- There are five types of palmately compound leaves as:

1. Unifoliate
2. Bifoliate
3. Trifoliate
4. Quadrifoliate
5. Multifoliate.



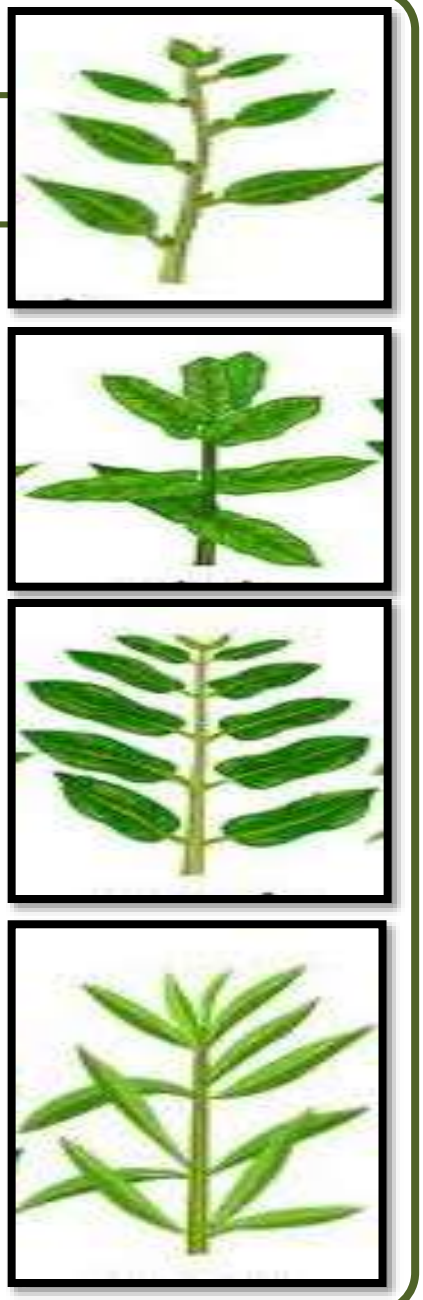
Morphology of Leaf

PHYLLOTAXY:
Phyllotaxy is the **arrangement of leaves** on the stem and branches

ALTERNATE PHYLLOTAXY:
- In this type, **single leaf** arises at each node.
- The leaves arise **laterally** on the stem or branches,
- e.g., *Sunflower, Mango, China rose, Mustard etc.*

OPPOSITE PHYLLOTAXY:
In this type, **two leaves** arise from each node in opposite direction. It is of two types:
DECUSSATE : When **one pair** of leaf is placed at **right angle** to next or **lower pair** of leaf, it is said to be opposite decussate phyllotaxy. e.g., *Calotropis, Ocimum,* etc.
SUPERPOSED: In this type, **all the pairs** of leaves on the stem are arranged **one above** the other, e.g., *Jamun, Guava, etc.*

WHORLED OR VERTICILLATE PHYLLOTAXY:
- In this type **more than two leaves** arise from **each node** and form a **whorl** around it.
- e.g., *Nerium, Alstonia*



Morphology of Leaf

MODIFICATIONS OF LEAVES:

LEAF SPINES:

- In some **xerophytic** plants like *Opuntia,* the entire leaf gets modified into a small, stiff, pointed structure called **spine** to check transpiration.

- Sometimes only a part of leaf such as **stipules**, get modified into **spines**, to protect plants from grazing animals,
- e.g., *Zizyphus* and *Acacia*.

Morphology of Leaf

MODIFICATIONS OF LEAVES:

LEAF TENDRILS:

- In certain plants having **weak stem**, entire **leaf** or a part of it gets modified into an **elongated**, thin, cylindrical, **coiled**, **wiry**, sensitive structure known as tendril.
- These tendrils help the plant to climb up on some **support**.

- In *wild pea (Lathyrus)*, **entire** leaf is tendrillar,

- in *sweet pea (Pisum sativum)* terminal **leaflets** are tendrillar,

- in *Gloriosa* only the **leaf apex** modifies into tendril, and

- in *Smilax*, **stipules** become tendrillar.

Morphology of Leaf

MODIFICATIONS OF LEAVES:

LEAF HOOKS:

- In *Bignonia unguis-cati* (Cat's nail), the **terminal three leaflets** get modified into three stiff **curved** & pointed **hooks** which look like **cat's nail**.
- They cling to bark of tree (**support**) and help the plant for **climbing**. *Bignonia* is an elegant hook-climber

Morphology of Leaf

MODIFICATIONS OF LEAVES:

PHYLLODE:

- In some plants, petiole becomes **flat**, **green** and **leaf like** and performs **photo synthesis.** This is known as **phyllode**.
- For example, in *Acacia auriculiformis,* the normal **leaf** is bipinnately compound and **falls** off soon.
- The petiole gets modified into phyllode. This is xerophytic adaptation to reduce transpiration