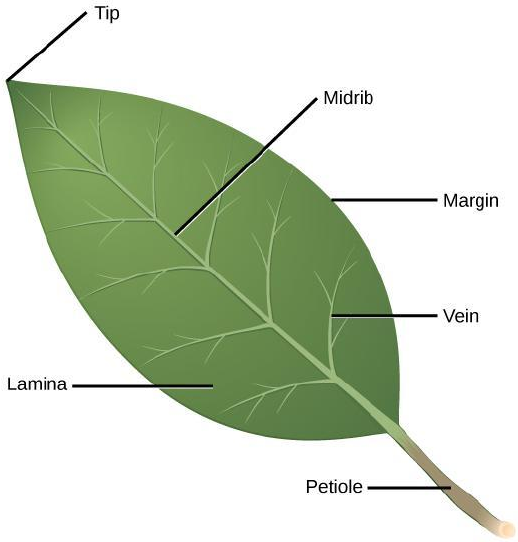
Prepared by Dr. Hadeel Radawi and Ruaa Fadhil Mansoor

Leaves: - They are specialized structures for photosynthesis that provide plants with energy.

Leaf structure: -



1- Blade (lamina): It is a flat and the widest part of the leaf.

2- Petiole:- It is a stalk like structure, when leaves are attached to the plant stem by a petiole and are called **petiolate leaves.** Leaves that do not have a petiole and are directly attached to the plant stem are called **sessile** (apetiolate) leaves.

3- Leaf Base: This is the part where a leaf attaches to the stem. Leaf base has two small leaf-like structure called **stipules**.

4-Stipules:- They are appendages at the base of the leaf.

Types of Leaves

There are two broad categories of leaves – simple and compound, which are further classified into different groups based on their shape, size, their arrangements on the stem.

The two different types of leaves found in a plant are:

Simple Leaf

When a single lamina is connected to the main stem by a petiole, the leaf is said to be simple. A simple leaf may be incised to any depth but not down to the midrib or petiole. Ex., Guava leaves

Compound Leaf

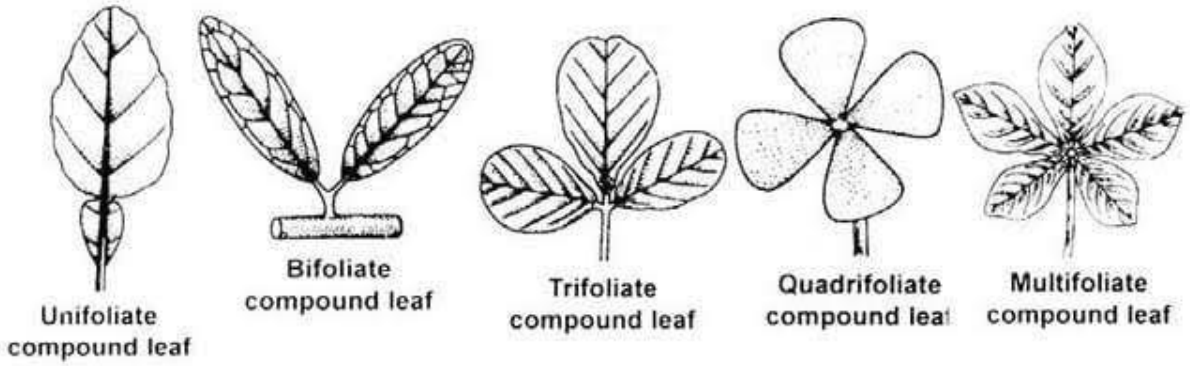
A compound leaf is a leaf made up of two or more leaflets. In a compound leaf, the midrib of the leaf is branched into different leaflets and is connected by a single petiole. For ex., Pea, palm leaves.

The compound leaves are further sub-divided into the following types of leaves:

Palmately Compound Leaf

In a palmately compound leaf, the leaflets are attached at the tip of the petiole. These can be differentiated into:

1. **Unifoliate:** These type of leaves have only one leaflet. Ex., *Citrus*
2. **Bifoliate:** These leaves have two leaflets. Eg., Balanites
3. **Trifoliate:** These leaves have three leaflets emerging from the same point. Ex., Oxalis
4. **Multifoliate:** This type of leaf has many leaflets arising at a common point. Eg., Bombax



Pinnately Compound Leaf

In a pinnately compound leaf, the midrib of the leaf is divided into numerous leaflets and all connected by a common axis. Ex., Neem. These can be further differentiated into:

1. **Pinnate:** A compound leaf that has an axis on each side of the midrib is known as a pinnate leaf. It is divided into:

A- Unipinnate: The leaf with leaflets on each side of the axis. Eg., cassia

B- Bipinnate: Here, a secondary axis bearing the leaflet is produced by the central axis. Eg., Acacia

C- Tripinnate: Here, a tertiary axis bearing leaflets emerges from the secondary axis. Eg., Moringa.

Venation: - It is defined as the arrangement of veins and the veinlets in the leaves. Different plants show different types of venations. Generally, there are two types of venations:

1- Reticulate venation: In a reticulate venation, the veinlets are randomly arranged and form a complex network of veinlets. Ex: Dicotyledonous plants.

2- Parallel venation: In a parallel venation, the veinlets run parallel to each other. Ex: In monocotyledons.

Phyllotaxy: - The arrangement of leaves on a stem. Leaves arrangements are classified as

1- **Alternate: -** Plants that have only one leaf per node have leaves that are said to be alternate.

2- Opposite: - Two leaves arise at the node (with the leaves usually connecting opposite each other along the branch).

3- Whorled: - If there are three or more leaves connected at a node, the leaf arrangement is classified as whorled.

Leaf shapes: -

1- **Linear: -** The width of leave is very narrow, compared to its length. with nearly parallel sides as in Grasses and Onion.

2- Acicular: Needle shaped, as in Pine.

3- Cordate: Heart shaped, with a deep notch at the base as in *Tilia cordata*

4-Deltoid: Triangular in shape

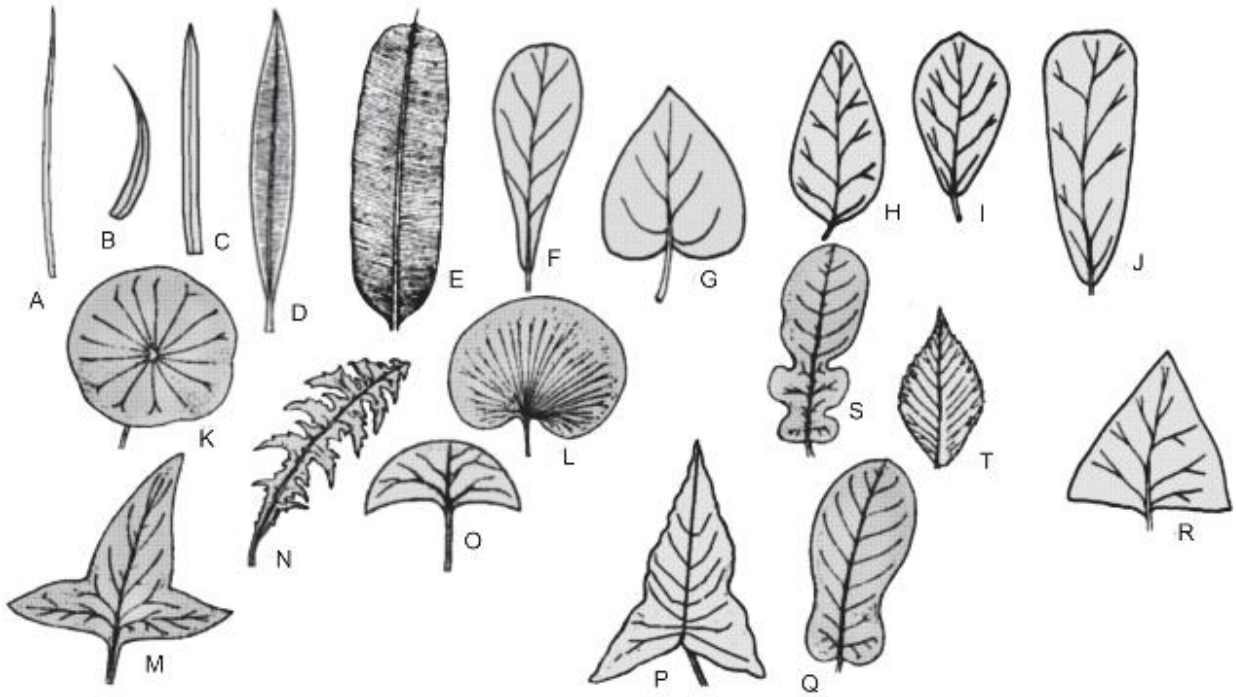
5- Elliptical: Shaped like an ellipse, a flattened circle usually more than twice as long as broad in Mint.

6- Lanceolate: Shaped like a lance, much longer than broad and tapering from a broad base towards the apex, as in bottle-brush plant.

7-Oblong: Uniformly broad along the whole length as in Banana.

8- Ovate: Egg-shaped, with broadest part near the base, as in Sida ovata.

9- **Sagittate:** Shaped like an arrowhead with two basal lobes pointed downwards as in *Convolvulus.*



Leaf outline. A: Acicular; B: Subulate; C: Linear, common in grasses; D: Lanceolate; E: Oblong; F: Spathulate; G: Cordate; H: Ovate; I: Obovate; J: Oblanceolate; K: Peltate; L: Reniform; M: Hastate; N: Runcinate; O: Lunate; P: Sagittate; Q: Pandurate; R: Deltoid; S: Lyrate; T: Elliptic

Exercise: Fill in the table with characters of leaves

Taxa	Leaf types	Leaf venation	Leaf phyllotaxy	Leaf shapes