

******Types of leaves:**

1- Simple leaf : A leaf with single, continuous blade (divided or not) as in *Citrus*.

2- Compound leaf: It has more than 2 distinct blades (leaflets) or pinna. Compound leaves may be classified into :-

A/ Pinnate compound leaves: The leaflets are borne separated along the rachis(like midrib of simple leaf). May be further differentiated :-

1- Unipinnate(simple pinnate): The leaflets are borne directly along the rachis. Unipinnate can be subdivided into :**1- Paripinnate**

2- Imparipinnate

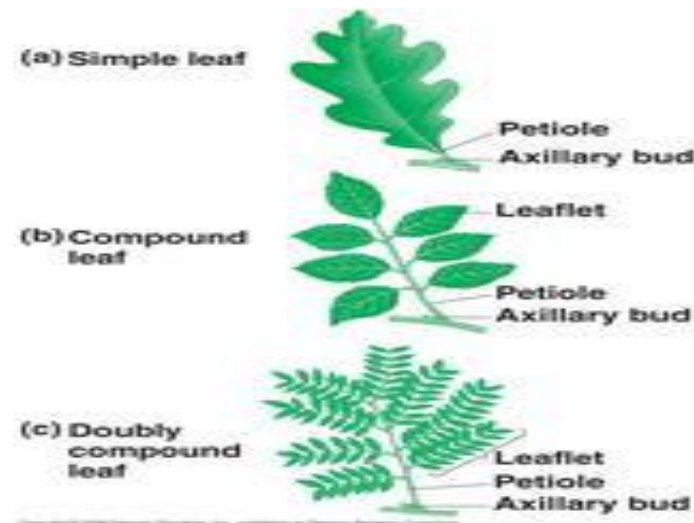
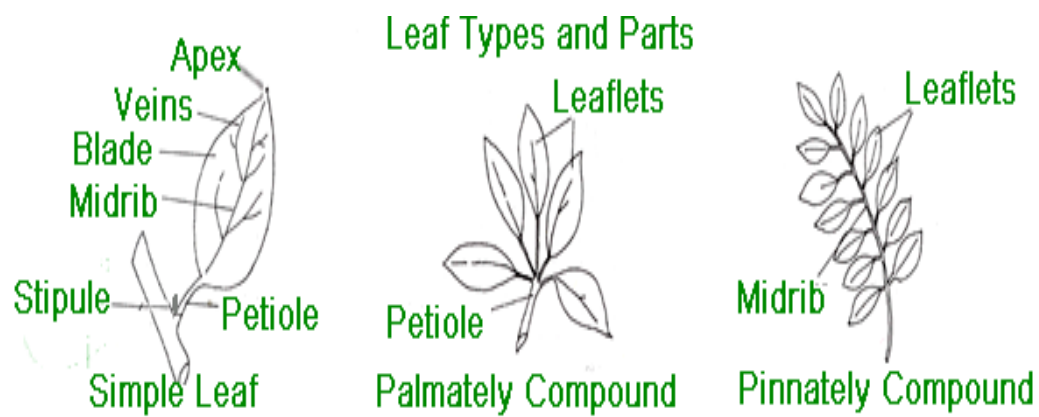
****Paripinnate leaf**: A pinnate leaf has a terminal leaflet (and typically even number of leaflet) as in *Cassia*.

****Imparipinnate**: There is terminal leaflet, resulting in odd number as in *Rosa*.

2-Bipinnate (twice pinnate): The pinnae (primary leaflets) are again divided into pinnules as in *Mimosa*.

3- Tripinnate: The dissection goes to the third order as in most members of Umblefera

B/ Palmate Compound leaves: In which four or more leaflet arise from the top of the petiole as in *Citrus*.

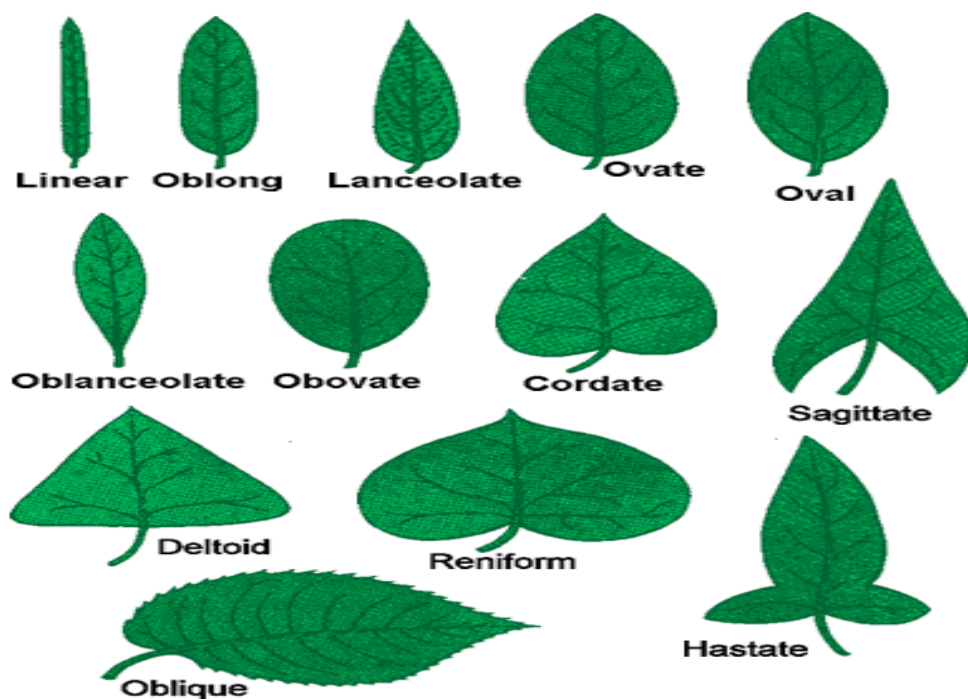


*******Leaf shape (outline of lamina):**

The shape of leaf shows considerable variability and is of major taxonomic value.

- 1- Acicular: Needle shaped as in *Pine*.
- 2- Cordate: Heart shaped, with deep notch at base as in *Piper*.
- 3- Lanceolate: Lance like shape, much longer than broad and tapering from a broad base towards the apex as in bottle-brush plant.
- 4- Elliptical: A flattened circle usually more than twice as longer as broad.
- 5- Linear: Long and narrow with nearly parallel sided as in Onion.
- 6- Oblong: Uniformly broad along the whole length as in Banana.

7- Ovate: Egg-shaped but with broadest part near the apex.



*****Venation:

The distribution of vascular bundles that are visible on the surface as veins. The major vein of leaf, with respect to the size is termed the primary vein, from the primary (vein)s, smaller, later veins may branch off these known as secondary veins.

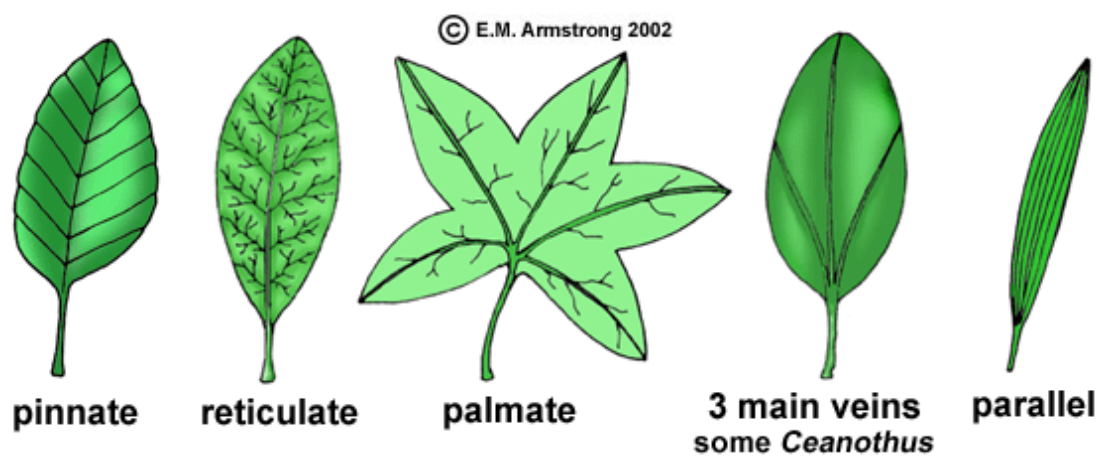
***Venation patterns:- Very general venation classes are as follow:

- 1- Uninervous: In which, there is a central midrib with no lateral veins as in conifers.
- 2- Dichotomous: Veins successively branch distally into a pair of veins of equal size and orientation as in Gingo.
- 3- Parallel : The primary and secondary veins are essentially parallel to one another, the ultimate veinlets being transverse at right angles as in most monocot. This venation can be classified as follow:-

A/ Penni-parallel or pinnate-parallel: The ultimate veinlets (penni-parallel) with secondary veins arising from a single primary vein regions which are parallel to each other as in Banana.

B/ Palmate-parallel: Several primary veins (of leaflets or leaf lobes) arising from one point, the adjacent secondary veins are parallel to these as in Fan palms.

4- Reticulate or netted: The ultimate veinlets form as inter connecting net like pattern e.g. most dicots. Reticulate veins can be pinnately veined and palmately veined.



*****Flower:** A highly modified shoot bearing a specialized floral leaves. Flowers show variability in shape and size, ranging from small one in *Lemna* to *Rafflesia* its diameter reaches to 120 cm.

*****Flower parts:** The basic parts of a flower, from the base to the apex are :-

1- Pedicel : Is the flower stalk (if a pedicel is absent, the flower is sessile).

2- Bract : A modified, generally reduced leaf borne on the side of a pedicel.

3- Bracteole or bractlet : A smaller or secondary bract on the side of a pedicel, where present typically paired.

4- Epicalyx : A series of bracts, immediately subtends the calyx as in *Hibiscus* and other members of Malvaceae.

5- Receptacle or torus : A region of flower to which other floral parts are attached.

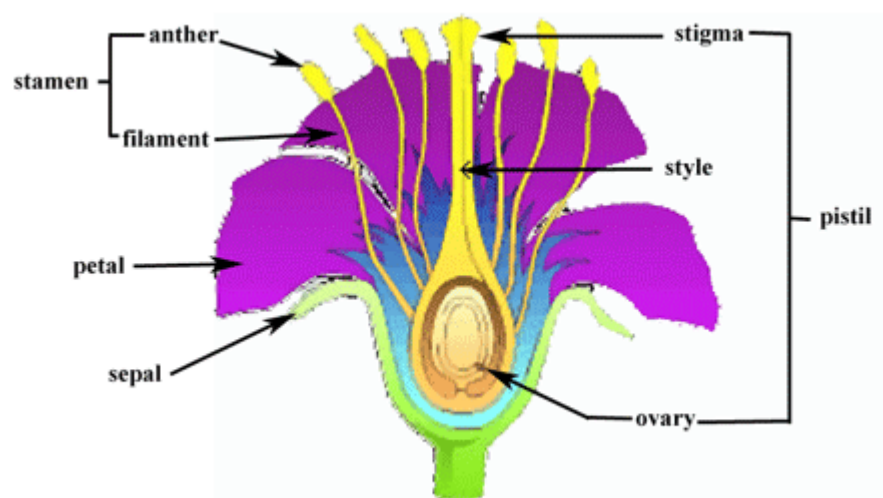
6- Perianth : The outer most non reproductive group of modified leaves of flower, if the perianth is undifferentiated, its components called tepals.

7- Calyx : It's the outer most series or whorl of modified leaves in the perianth, individual units of the calyx are sepals.

8- Corolla : It's the inner most series or whorl of modified leaves in the perianth, individual units of corolla are petals.

9- Androcium : It refers to all the male organs of a flower, collectively all the stamens.

10- Gynocium : It refers to all of the female organs of flower, collectively all the carpels.



***Flowers and plant sexuality :

Flower sex refers to the presence or absence of male and female parts with a flower.

1- Perfect(Bisexual) : Having both stamens and carpels.

2- Imperfect (Unisexual) : In this case flowers are either staminate or pistillate.

A/ Staminate: In which only stamens develop as in *Oak*.

B/ Pistillate : In which only carpels develop as in *Salix* , *Arum*.

- Plant sex refers to the presence and distribution of perfect or imperfect flowers on individuals of a species:
 - A/ Hermaphrodite : A plant with only bisexual flowers.
 - B/ Monoecious : Plant with only unisexual flower, both staminate and pistillate on the same individual plant as in *Quercus*.
 - C/ Dioecious : A plant with unisexual flowers but with staminate and pistillate on the separate individual plants as in *Salix*.
 - D/ Polygamous : plant with both bisexual and unisexual flowers.