

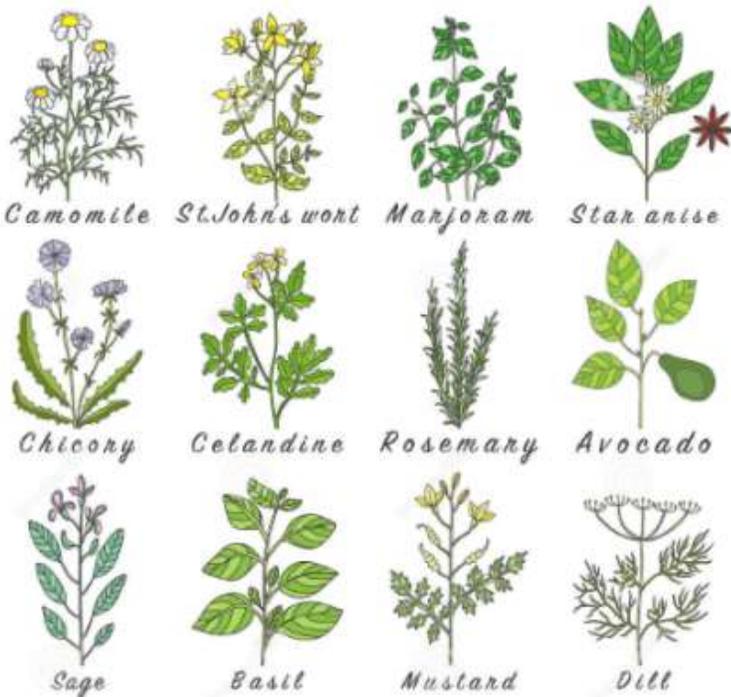
As we all know, Earth is the only planet in our solar system that has the viable conditions for life to exist. While the presence of water and oxygen is the main reason, we must also recognize that life would not have been possible if it weren't for the oxygen-emitting plants, life would not have been able to take shape on Earth. These plants are not only our source of oxygen but also the major source of the food that we eat.

Herbs, Shrubs and Trees

We can classify plants on the basis of the thickness of their stems and the place of origin of their branches, into three broad categories:

Herb: These are plants that have green and frail stems. Usually, these are small plants with not many branches.

Some common examples of herbs are Basil, Coriander, Mint, Oregano, Thyme, Parsley, Rosemary etc.



Herbs: Small plants with tender stems



Common herb examples

Shrubs: These are plants with hard but not exactly thick stems. Their branches generally originate from the base of their stems. These are much taller than herbs but usually shorter than trees.

Some common examples of shrubs are Aloe Vera, Rose plant, Jasmine plant, Blackberry plant etc.



Common shrub examples

Trees: These are plants which are very tall and have a thick and hard stem. The branches originate from the upper part of the tree and are very high above the ground.

Some common examples of trees are neem, peepal, coconut tree, mango tree etc.



Neem Tree



Mango Tree



Coconut Tree

Some common examples of trees

There are two other kinds of plants which are:

Creepers: These are plants which have soft, weak and green stems and hence cannot stand straight and instead spread on the ground.

Some common examples are sweet potato, watermelon, pumpkin etc.



Pumpkin



Watermelon



Muskmelon

Some common examples of creepers

Climbers: These are also plants with soft and weak stems but instead of spreading on the ground they take support with a nearby object to climb up.

Some common examples of creepers are cucumber, bean, grapevine, money-plant etc.



Pea Plant



Grapevine

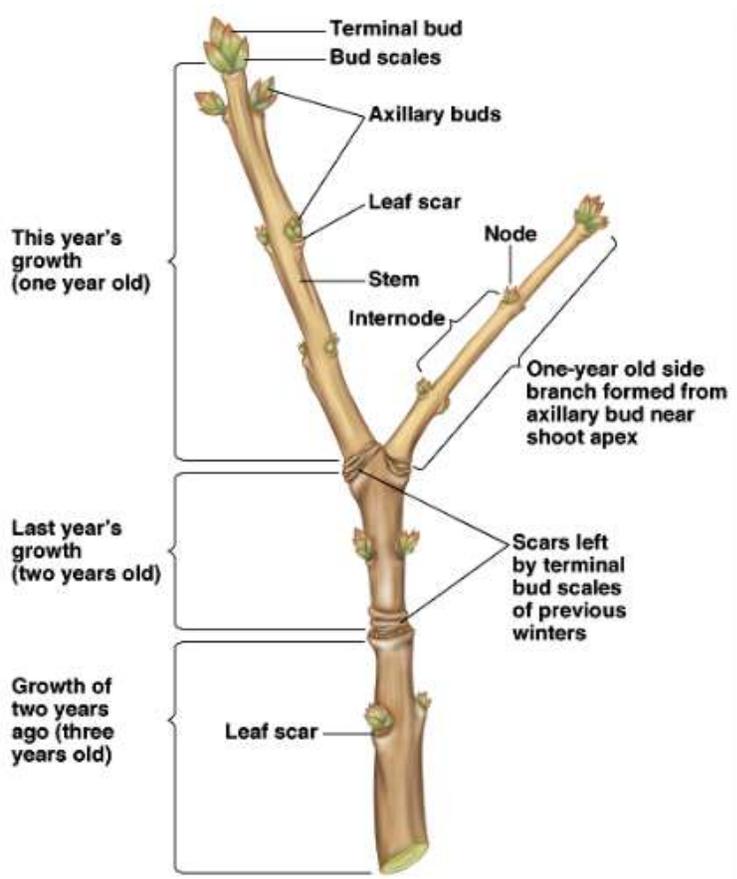


Money Plant

Some common examples of climbers

Let us observe and study each part of a plant step by step:

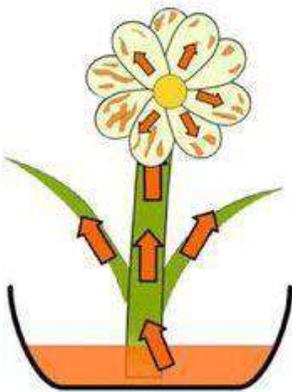
Stem



Growth cycle of a common stem

The Stem is the part of a plant which is responsible for supplying water to all parts of the plant. It is the stem which bears branches, flowers, leaves, fruits and buds. The root sucks the water and minerals from the soil and it is the stem's function to push this water upward to other parts of the plant.

We can observe this by soaking the stem of a plant in a glass with water. On adding coloured ink to the water, we observe that after a while the stem and leaves of the plant start to turn the colour of the ink, which is proof that the stem carries the water to the different parts of the plant.



The experiment helps demonstrate how stems are responsible for carrying water to different plant parts

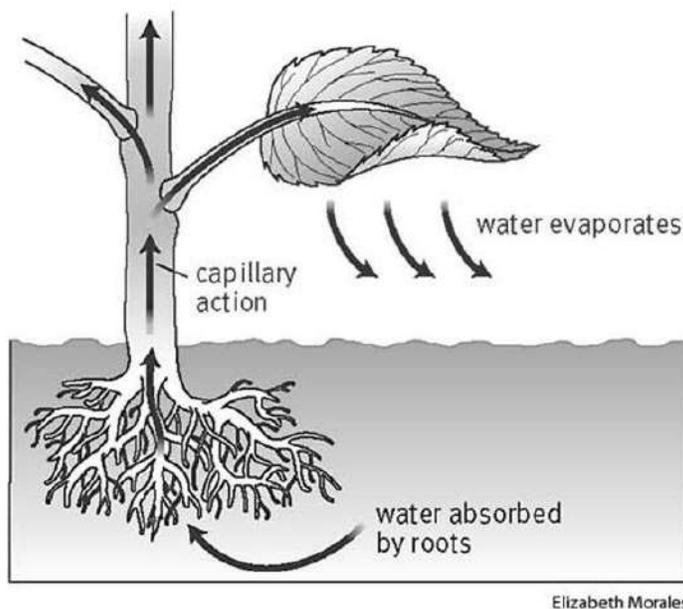
Leaf

The leaves of plants are majorly responsible for performing two essential functions for the plant's survival and growth. These two functions are called transpiration and photosynthesis.

Transpiration: Transpiration is the process through which plants release the excess amount of water in the air. When the water travels via the stem to the leaves, some of it gets used up to prepare food, while the excess water is converted to water vapour due to the presence of the sun. Transpiration is important for the plants as it helps the plants to cool down. In the absence of transpiration, the temperature of the leaf becomes unregulated which may lead to the eventual death of the plant.

We can observe transpiration by enclosing a leafy part of a plant in a closed polythene bag and keeping it in the sun. After a while, we see tiny droplets of water on the inside of polythene bags, which are proof that the leaves have performed transpiration.

Transpiration



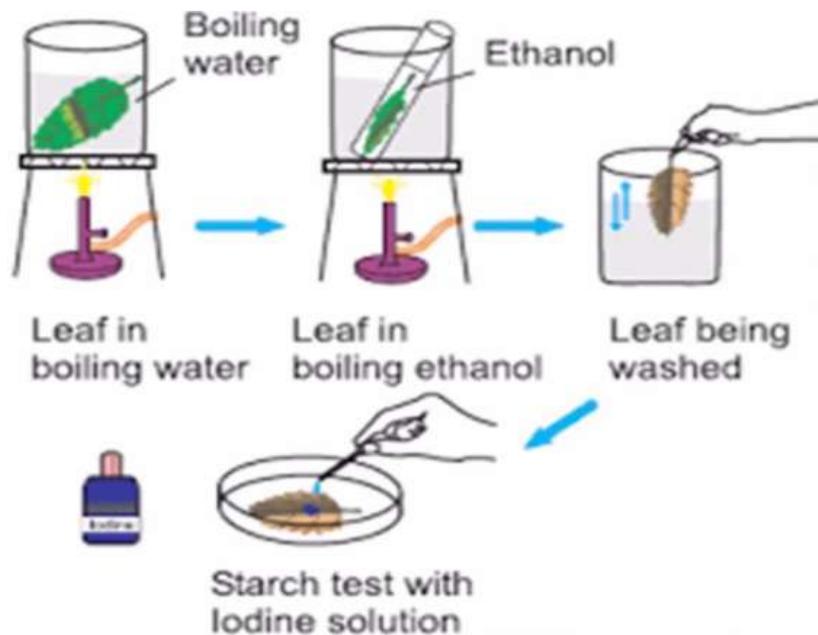
Transpiration
– evaporation
of water from
the leaves.

Transpiration
stream –
movement of
water
through the
plant.

The process of transpiration

Photosynthesis: Photosynthesis is defined as the process that helps leaves prepare food for the plant with the help of carbon dioxide and water. Photosynthesis occurs in the presence of the sun and is aided by the presence of a green pigment in leaves called chlorophyll. Plants also release oxygen in the process. The food prepared is stored in various parts of the plant. In absence of photosynthesis, the plant is unable to utilize the water and minerals to prepare food for its nourishment and gradually dies.

In order to see if leaves really do perform photosynthesis, we take a leaf and immerse it in a test tube filled with spirit. Placing this test tube in a beaker filled with water, we heat the beaker. After the leaf loses its color, we wash it and pour iodine solution on it, as can be seen below, which shows the presence of starch thus disproving our doubts.



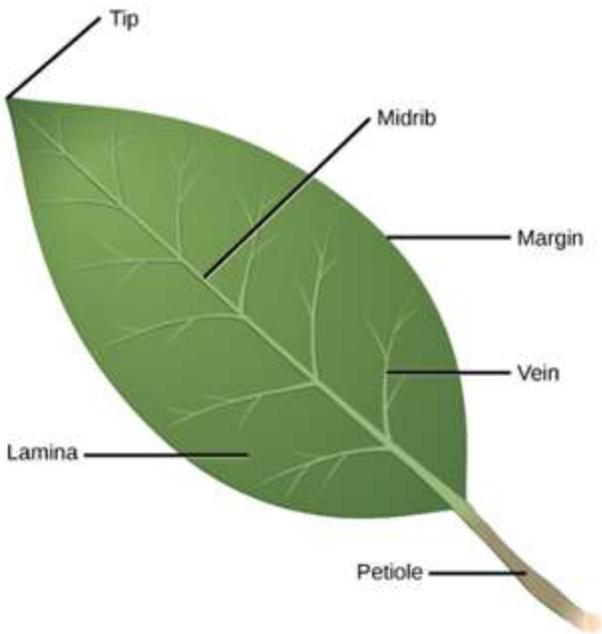
Parts of a Leaf

Petiole: This is the stalk via which the leaf is joined to the plant.

Lamina: This is the expanded part or the green portion of any leaf which is responsible for photosynthesis.

Veins: The many lines that run through the surface of the leaf are called veins and the design made by them is called leaf venation. They transport water and minerals.

Midrib: This is the central, prominent thick structure right in the middle of the leaf that helps support the leaf and prevent it from breaking.

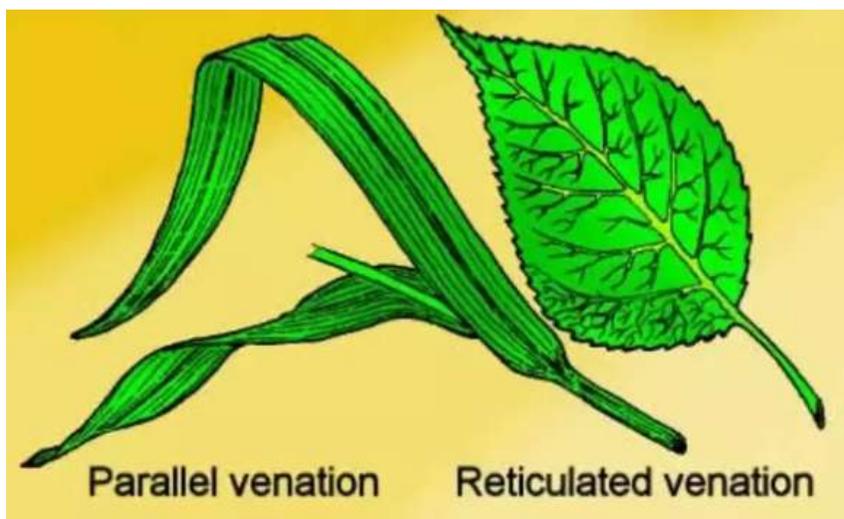


A labelled diagram of a leaf

We distinguish between two major types of leaf venation.

Reticulate venation is said to exist when the veins form a net-like shape on either side of the midrib. This type of venation is seen to exist in dicots like guava and mango.

Parallel venation is said to exist when the veins run parallel to one another. This type of venation is seen to exist in monocots like banana, wheat, coconut etc.



Parallel and reticulate venation

Root

The root is a very important component of the plant system, as, without the presence of roots the plant ceases to exist. This is because the roots perform three major functions essential to the growth and survival of the plant which are:

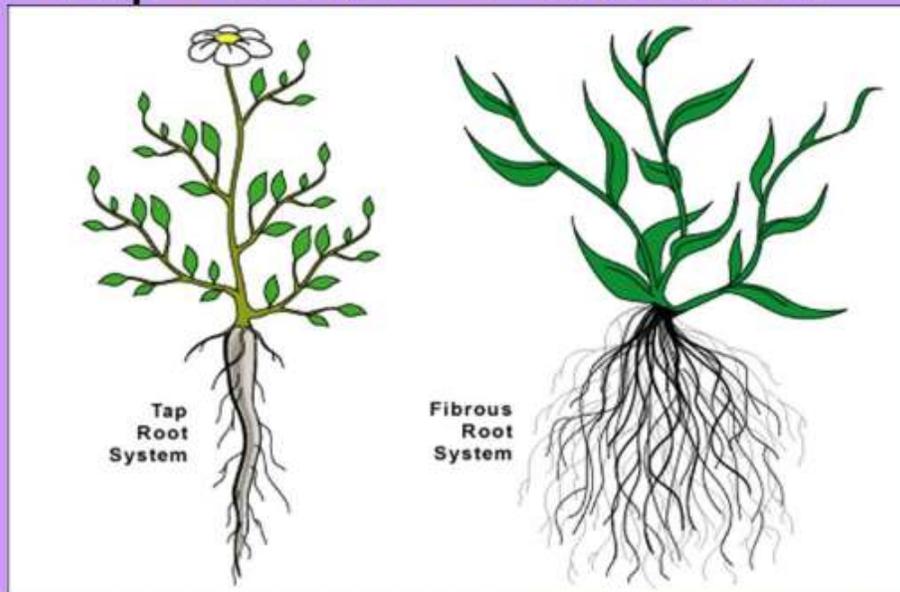
- Roots are responsible for absorbing minerals and water from the soil and transferring them to the stem. It's only after the root has transported water and minerals to the stem that the stem becomes capable of transporting these to all parts of the plant.
- Another important function of roots is to firmly anchor the plant in the ground. This is essential to support the upright position of the plants

Tap Roots	Fibrous Roots
1. In this type of root system, there is one prominent and long root and a bunch of smaller roots that grow from this main root called lateral roots.	1. In this type of root system, a group of similar sized roots emerge from the base of the plant. They do not have a main root.
2. It is hard to pull out plants with tap roots as these go deep within the soil.	2. These plants are relatively easier to pull out as the roots don't go very deep in the soil.
3. This root system is seen to exist in plants with leaves displaying reticulate venation.	3. This root system is seen to exist in plants with leaves displaying parallel venation
4. Examples of plants with tap roots: carrots, turnip, gram, gram, China rose etc.	4. Examples of plants with fibrous roots: banana, wheat, maize, onion, bamboo etc.

- Roots also perform the function of storing important nutrients and food for growth.

There are two major types of roots that exist in plants and these are:

Tap root vs. Fibrous root



the primary root grows longer and thicker than the secondary roots

the secondary roots continue to grow, and eventually all the roots are of equal or nearly equal size

Flower

The flowers are the colourful, seed-bearing parts of the plant that grows at the end of the stem. A typical flower exhibits the following structure:

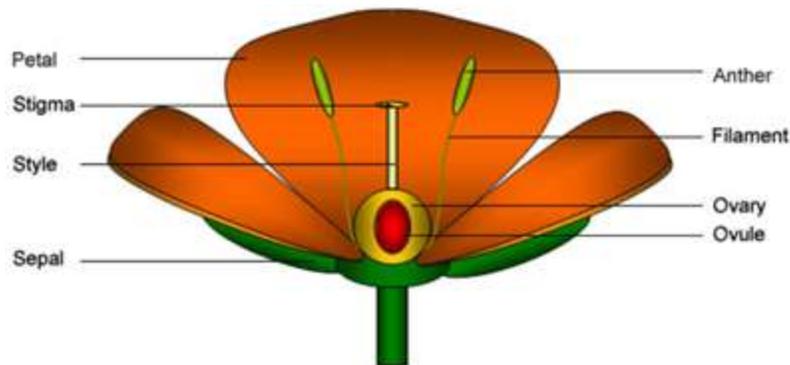
Petals: These are bright, colourful and broad parts of the flower. Taken together, the petals of the flower form what is called a Corolla.

Sepal: This is the green, leaf-like structure of the flower that encloses the petals and is responsible for protecting the flower when it is in its bud form and supporting it when it is in its bloom stage.

Stamen: These are the long and slender parts of the flower that become visible upon removing the petals and sepal of a flower. Typically, a stamen consists of an anther i.e. the head of the stamen and a filament i.e. the long cream-colored stick. The stamen is also known as the male reproductive part of the plant.

Pistil: This is the innermost part of the flower, typically consisting of a stigma i.e. the head of the pistil, a style, which is the long sticky part that attaches the stigma to the ovary i.e. the small and

swollen sphere at the base of the pistil. Pistil is the female reproductive part of any flower. The ovary contains small bead-like structures which are called ovules.



The structure of a flower



Important Definitions

Stomata: These are the small microscopic pores present on the leaf through which exchange of gases and transpiration takes place.

Annuals: These are plants like wheat and maize that complete their life cycle in one season and then die. They are usually herbs.

Biennials: These are plants like carrots and radishes that complete their life cycle in two seasons.

Perennials: These are plants guava and palm that continue their life cycle for more than two seasons, i.e. they manage to re-grow every spring.

Aerial roots: These are roots of plants and trees that grow above the ground instead of under the ground as shown in the image below.

Transpiration: The loss of water in the form of vapours from the stomata on leaves is called transpiration.



Aerial Roots