Under the Earth

The root is a plant organ that is usually found under the soil. It has positive geotropism; its main functions are absorbing water and inorganic nutrients and attaching the plant to the ground. The root is essential for identifying the particular characteristics of a plant. The anatomical structure of a root can vary, but, because it does not have leaves or nodes, it will always be simpler than that of a stem.

Types of Roots

Roots differ, depending on their origin. The primary root originates in the radicle of the embryo. An adventitious root is one that originates in any other organ of the plant. Roots are also subdivided according to their morphology.

TAPROOT
A taproot grows downward and has lateral secondary roots that are not well developed.

BRANCHED
The main root is divided, creating other secondary roots.

FIBROUS
The root system is formed by a group of roots of similar diameter.

TUBEROUS
Fibrous in structure, some of the roots thicken to store food for the plant.

NAPIFORM
The taproot thickens with stored food and tapers abruptly near its tip.

TABULAR
Tabular roots form at the base of a trunk and create a supporting buttress.

GEOTROPISM
Geotropism, or gravitotropism, is the growth of a plant or parts of a plant in a particular direction because of the stimulus of gravity. The force of gravity orients the stems and their leaves to grow upward (negative geotropism), whereas the roots grow downward (positive geotropism).

Monocotyledons

These plants have embryos with only one cotyledon. Their embryonic root generally has a relatively short life and is replaced by adventitious roots that grow from the stem.

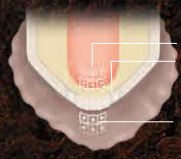
GROWTH AND CELLULAR DIVISION
Through the process of cell division a cell divides into two cells, each with its own nucleus. The new cells elongate, allowing the root to grow in thickness and length.

NECK
Transitional area between the root and the stem

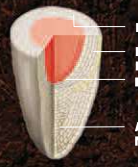
BRANCHING AREA
A porous region whose function is to anchor and absorb

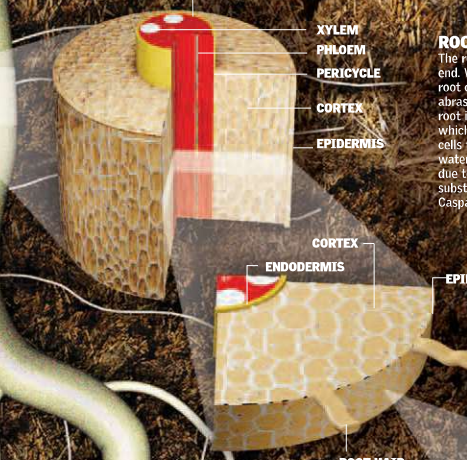
PILIFEROUS AREA
The part of the root covered with slender elongations called roots hairs. The root hairs increase the surface area through which water and minerals can be absorbed.

GROWTH AREA
Area of cell growth and elongation



ROOT CAP
The thimble-shaped structure that protects the meristem of the tip of the root as it penetrates the soil





ROOT STRUCTURE
The root cap is found at one end. While the root grows, the root cap protects it from soil abrasion. The interior of the root is formed by the cortex, which has a compact layer of cells that affect the flow of water through the root. This is due to the presence of a waxy substance that forms the Casparian strip.

WATER
enters through the root hairs and travels to the epidermal cells.

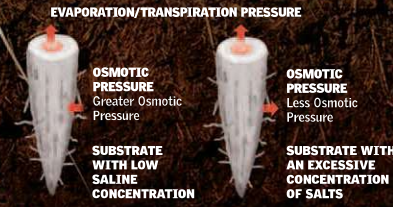
CASPARIAN STRIP

CELL WALL

PLASMA MEMBRANE

NUTRIENTS
depend on the quantity of nutrients in the soil and on the roots' ability to transport them.

OSMOSIS
The process through which plants absorb water from the soil. Water penetrates into the roots when it has a greater concentration in the soil than in the intracellular environment of the root.



Dicotyledon

A plant that has seeds with two embryonic leaves (cotyledons). It has a tap root, and the leaves are usually petiolated with a reticulated vein distribution. Their internal organization consists of open conducting vessels in a circular arrangement.