

which can quickly absorb any rain that falls before it evaporates in the hot conditions.

Bulbs

Some plants use swollen, underground leaf bases to form food storage organs called bulbs. These enable plants to survive over winter when photosynthesis may not be possible. Onions and daffodils are examples of plants that produce bulbs.

Leaves

Many plants survive in very arid climates where water loss from leaves would cause problems. To deal with it, some plants have very waxy leaves to minimise water loss, while others have reduced leaves or no leaves at all. Plants in both temperate and tropical regions have evolved modified leaves called tendrils, which have a mechanism for getting their leaves into sunlight even when they are shaded by surrounding vegetation. Tendrils enable the plant to cling onto other plants or objects so that they are supported when they grow and they climb up towards the light.

Stem Tubers

Tubers are stems that grow below the ground and are used to store food. Potatoes are stem tubers that store carbohydrates in the form of starch.

Meristems

Meristems are the growing part of a flowering plant, where cells may divide by mitosis throughout the life of the plant. There are two types of meristem in a dicotyledon plant. Number one, apical meristems, found at the tip of the root and the shoot and number two, lateral meristems, found in the vascular bundles of the stem. Growth in the main stem occurs at the apical meristem, which is known as primary growth. Many plants also grow at lateral meristems, which makes the stems and the roots thicker and is known as secondary growth.

If plants are damaged at the apical meristems, often the first lateral meristem is induced to grow and take over until the apical meristem is repaired and ready to grow again.

Auxin and Phototropism

Plants produce growth regulating substances that act to control growth and development. These substances are sometimes called plant hormones. It was first observed by Darwin that the plant shoots grow towards the light because of some influence, which he proposed was transmitted from the shoot tip to the area immediately below.

inside leaves. A lining of hairs on the inner side of the leaf keeps humid air trapped inside the rolled up leaf. Hairs prevent water loss by diffusion.

Some xerophytes have evolved a mechanism allowing them to keep their stomata closed during the heat of the day. At night the stomata open and carbon dioxide diffuses into the leaf. It is temporarily fixed in cells and then is released for photosynthesis during the day.

Translocation in the Phloem

Translocation is the movement of organic molecules through the phloem tissue of the plant. The phloem consists of two types of living cells:

(1) Siebe tube cells - which are perforated to allow the movement of solutes through them.

(2) Companion cells - which are connected to the siebe tube cells.

Where as the xylem only carries water and mineral salts only in an upward direction, the phloem can transport materials either up or down the plant. Translocation moves materials from the source where it is made or stored to a sink where they are used. The products of photosynthesis including sugars and amino acids move from leave cells, which are the source, into the phloem. Once in the phloem, they are translocated into sink regions such as growing tissues in the meristems of roots, buds and stems or storage organs like fruits and seeds. All the materials that are moved by active translocation are dissolved in water to form a solution called sap, which also carries plant hormones. Sugar is usually carried as sucrose, which enters and leaves the phloem by active transport using energy provided by the companion cells. Once materials have entered the phloem, the move passively through the plant.

Sink and source can change depending on the needs of the plant or seasonal changes.

Reproduction in Angiospermophytes

Flowers

There is enormous variety in the shapes and structures of flowers, e.g. some are male and some are female and some have both male and female parts. Flowers also differ in the way they are pollinated. Animal pollinated flowers need structures to attract pollinators, whereas flowers that use the wind to pollinate the flowers do not.