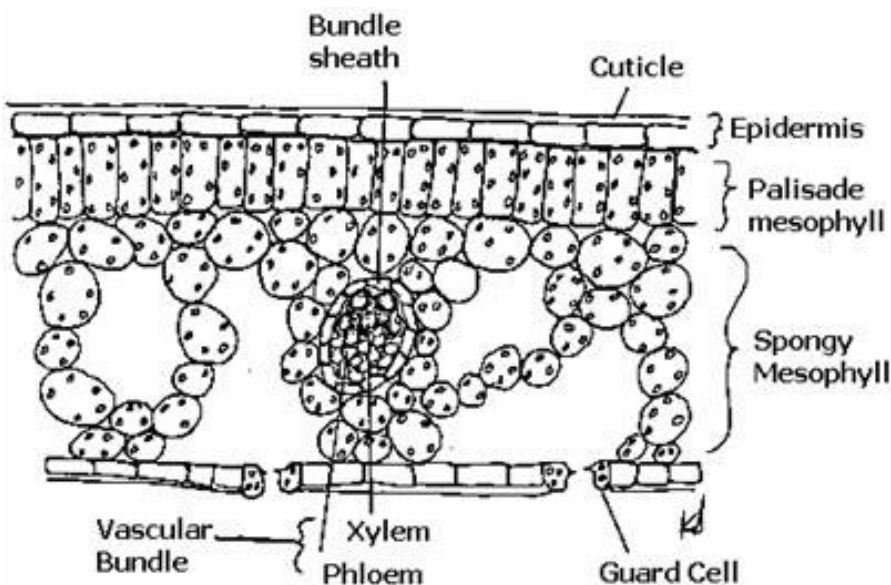
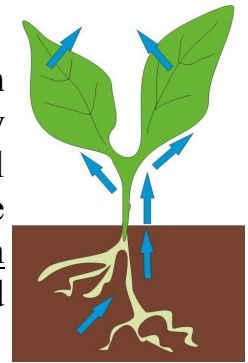


# Biology Top-Up

## Transpiration

### Transpiration

The process of transpiration is simply the evaporation of water from any part of the plant exposed to the air. The majority of water lost by evaporation is lost from the underside of the leaves through small pores called stomata, although some is also lost through the stem. The pathway taken by water through the plant is called the transpiration stream. It is necessary for the transport of water and minerals, and also to help to prevent the plant from overheating.



### Gas exchange in the leaves

The main function of the stomata is to allow gas exchange to take place. Oxygen is needed for respiration, and carbon dioxide is needed for photosynthesis. These cannot diffuse into the leaf because the cuticle (a waxy layer that limits water loss) is impermeable to gases.

Most plants will open their stomata when the light intensity is high enough for the rate of photosynthesis to be high. The problem with this is that water vapour diffuses out through these pores.

### Factors affecting transpiration

There are four factors which affect the rate of transpiration. The first three all affect the water potential gradient (the concentration gradient of water) between the inside and outside of the leaf. The larger the difference in water potential, the faster the loss of water.

1. *Humidity*      The more humid the air outside the leaf, the less water will be lost
2. *Temperature*      Higher temperatures increase the rate of evaporation, and also increase the amount of water vapour that the air can hold
3. *Wind speed*      Air movement carries water vapour away from the stomata, increasing the water potential gradient
4. *Light*      The higher the light intensity the more stomata are open for gas exchange, increasing the rate of water loss