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Transpiration:

Transpiration is the evaporation of water from plants. Most of the water absorbed by the roots of a plants much as 99.5% is not used for growth or metabolism; it is excess water, and it leaves the plant through transpiration. Transpiration is very important for maintaining moisture conditions in the environment. As much as 10 percent of the moisture in the Earth's atmosphere is from transpiration of water by plants.

Transpiration was first measured by Stephen Hales (1677–1761), an English botanist and physiologist. He noticed that plants "imbibe" and "perspire" significant amounts of water compared to animals and created a novel method for measuring the emission of water vapor by plants. He found that transpiration occurred from the leaves and that this process encouraged a continuous upward flow of water and dissolved nutrients from the roots. Modern research has shown that as much as 99 % of the water taken in by the roots of a plant is released into the air as water vapor.

Leaf stomata are the primary sites of transpiration and consist of two guard cells that form a small pore on the surfaces of leaves. The guard cells control the opening and closing of the stomata in response to various environmental stimuli and can regulate the rate of transpiration to reduce water loss. Darkness and

internal water deficit tend to close stomata and decrease transpiration; illumination, ample water supply, and optimum temperature open stomata and increase transpiration. Many plants close their stomata under high temperature conditions to reduce evaporation or under high concentrations of carbon dioxide gas, when the plant likely has sufficient quantities for photosynthesis.

Transpiration is of three types:

1. Stomatal transpiration:

Most of the transpiration takes place through stomata. Stomata are usually confined in more numbers on the lower sides of the leaves. In monocots, example grasses, they are equally distributed on both sides. While in aquatic plants with floating leaves they are present on the upper surface.

2. Cuticular transpiration:

The cuticle is impervious to water, even though, some water may be lost through it. It may contribute a maximum of about 10% of the total-transpiration.

3. Lenticular transpiration:

Some water may be lost by woody stems through lenticels which are called as lenticular transpiration.

Mechanism of stomatal transpiration:

The mechanism of stomatal transpiration which takes place during the daytime can be studied in three steps.

- Osmotic diffusion of water in the leaf from xylem to intercellular space above the stomata through the mesophyll cells.
- Opening and closing of stomata (stomatal movement).
- Simple diffusion of water vapors from intercellular spaces to another atmosphere through stomata.