

# FACTORS AFFECTING RATE OF TRANSPIRATION

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## DEFINITION

The loss of water in the form of vapour from the aerial parts of the plant is known as **transpiration**. The rate of transpiration is influenced by many factors.

## EXTERNAL FACTORS

**Light** – Light affects the rate of transpiration by the opening of stomata. In the dark due to closure of stomata the stomatal transpiration is almost stopped. Light also affects the rate of transpiration by increasing the permeability of the protoplasmic membrane, which causes the easy passage of water to the atmosphere.

**The humidity of the air** – At low relative humidity, the atmosphere is dry and unsaturated and has a great capacity to absorb water; this enhances the rate of transpiration. On the other hand, if the atmosphere is relatively saturated its capacity to absorb water is low and the rate of transpiration is slow down.

**Temperature** – The increase in temperature brings about an increase in the rate of transpiration.

1. As the temperature of the leaf increases the vapour pressure inside the mesophyll cells also increases in comparison to atmospheric vapour pressure enhances the rate of transpiration.
2. The rate of diffusion of water vapour through stomata is increased with the increase in temperature that increases the rate of transpiration.
3. With the increase of temperature the rate of diffusion of water vapour through stomata increases that increase the rate of transpiration
4. Temperature causes stomata to open quickly and widely that increase the rate of transpiration.

**Wind** – According to Martin and Clements (1935), a high-velocity wind increases the rate of transpiration initially but gradually declined due to

1. Cooling effect on the evaporating surface of the leaf lowers the vapour pressure gradient.
2. Increasing the loss of water from the mesophyll cells which results in flaccidity and closure of stomata.

**Available soil water** – If the availability of water in the soil is low the rate of absorption slowed down and the rate of transpiration decreases.

**The concentration of CO<sub>2</sub>** – As an increase in the concentration of CO<sub>2</sub> in the atmosphere and more so inside the leaf, leads to closure of stomata, that retards the transpiration.

### **INTERNAL FACTORS**

Structural features of plants – Rate of stomatal transpiration depend upon the size, position and distribution of stomata on the leaves. The presence of thick cuticle or wax coating on the exposed surface reduces the cuticular transpiration.

Various adaptations in Xerophytes like sunken stomata, reduction in leaf size or falling of leaves etc are the various means to reduce the rate of transpiration.