Transpiration Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Core: \_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Transpiration is the process by which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Up to \_\_\_\_\_\_% of water absorbed by roots is lost via transpiration through plant leaves. This water loss allows the plant to access \_\_\_\_\_\_\_\_\_\_ for photosynthesis and to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| Plant Parameters  *These help plants control rates of transpiration by serving as forms of resistance to water movement out of the plant.* | | |
| Cuticle | Stomata | Boundary |
| * The cuticle is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ present on all above-ground tissue of a plant and serves as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to water movement out of a leaf. * Because the cuticle is made of wax, it is very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or ‘water-repelling’; therefore, water does not move through it very easily. * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_the cuticle layer on a leaf surface, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the transpiration rate. | * Stomata are \_\_\_\_\_\_\_\_\_\_ in the leaf that allow gas exchange where \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ leaves the plant and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ enters. * Special cells called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ control each pore’s opening or closing. * When stomata are \_\_\_\_\_\_\_\_\_, transpiration rates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; when they are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, transpiration rates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | * The boundary layer is a thin layer of \_\_\_\_\_\_\_\_\_\_ hugging the surface of the leaf. * This layer of air is not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. * For transpiration to occur, water vapor leaving the stomata must diffuse through this motionless layer to reach the \_\_\_\_\_\_\_\_\_\_\_\_\_ where the water vapor will be removed by moving air. * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the boundary layer, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the rates of transpiration. |

|  |  |  |  |
| --- | --- | --- | --- |
| Environmental Conditions  *Some environmental conditions create the driving force for movement of water out of the plant. Others alter the plant’s ability to control water loss.* | | | |
| Humidity | Temperature | Light | Wind |
| * Relative humidity (RH) is the amount of water vapor in the \_\_\_\_\_\_\_ compared to the amount of water vapor that air could hold at a given temperature. * Any decrease in water in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ creates a need for water to move from the leaf to the atmosphere. * The lower the RH, the less moist the atmosphere and thus, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the driving force for transpiration. * When RH is \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the atmosphere contains more moisture, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the driving force for transpiration. | * Temperature greatly influences the driving force for \_\_\_\_\_\_\_\_\_\_\_\_ movement out of a plant rather than having a direct effect on stomata. * As temperature \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the water holding capacity of that air increases sharply. * The amount of water does not change, just the ability of that air to \_\_\_\_\_\_ water. * Because warmer air can hold \_\_\_\_\_\_\_\_\_\_\_\_ water, its relative humidity is less than the same air sample at a \_\_\_\_\_\_\_\_ temperature, or it is ‘drier air’. * Because cooler air holds \_\_\_\_\_\_\_\_\_\_\_\_ water, its relative humidity increases or it is ‘moister air’. * Therefore, warmer air will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the driving force for transpiration and cooler air will \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the driving force for transpiration. | * Stomata are triggered to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the light so that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is available for the light-dependent process of photosynthesis. * Stomata are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the dark in most plants. * Very \_\_\_\_\_\_\_\_\_\_ levels of light at dawn can cause stomata to \_\_\_\_\_\_\_\_\_\_\_\_ so they can access carbon dioxide for photo-synthesis as soon as the \_\_\_\_\_\_\_\_\_\_\_\_ hits their leaves. * Stomata are most sensitive to \_\_\_\_\_\_\_\_\_\_\_\_ light, the light predominating at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | * Wind can \_\_\_\_\_\_\_\_\_\_\_\_\_\_ rates of transpiration by removing the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer, that still layer of water \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hugging the surface of leaves. * Wind \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the movement of water from the leaf surface when it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the boundary layer, because the path for water to reach the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is shorter. |

http://www.sciencemag.org/site/feature/misc/webfeat/vis2005/show/transpiration.swf