

Transpiration

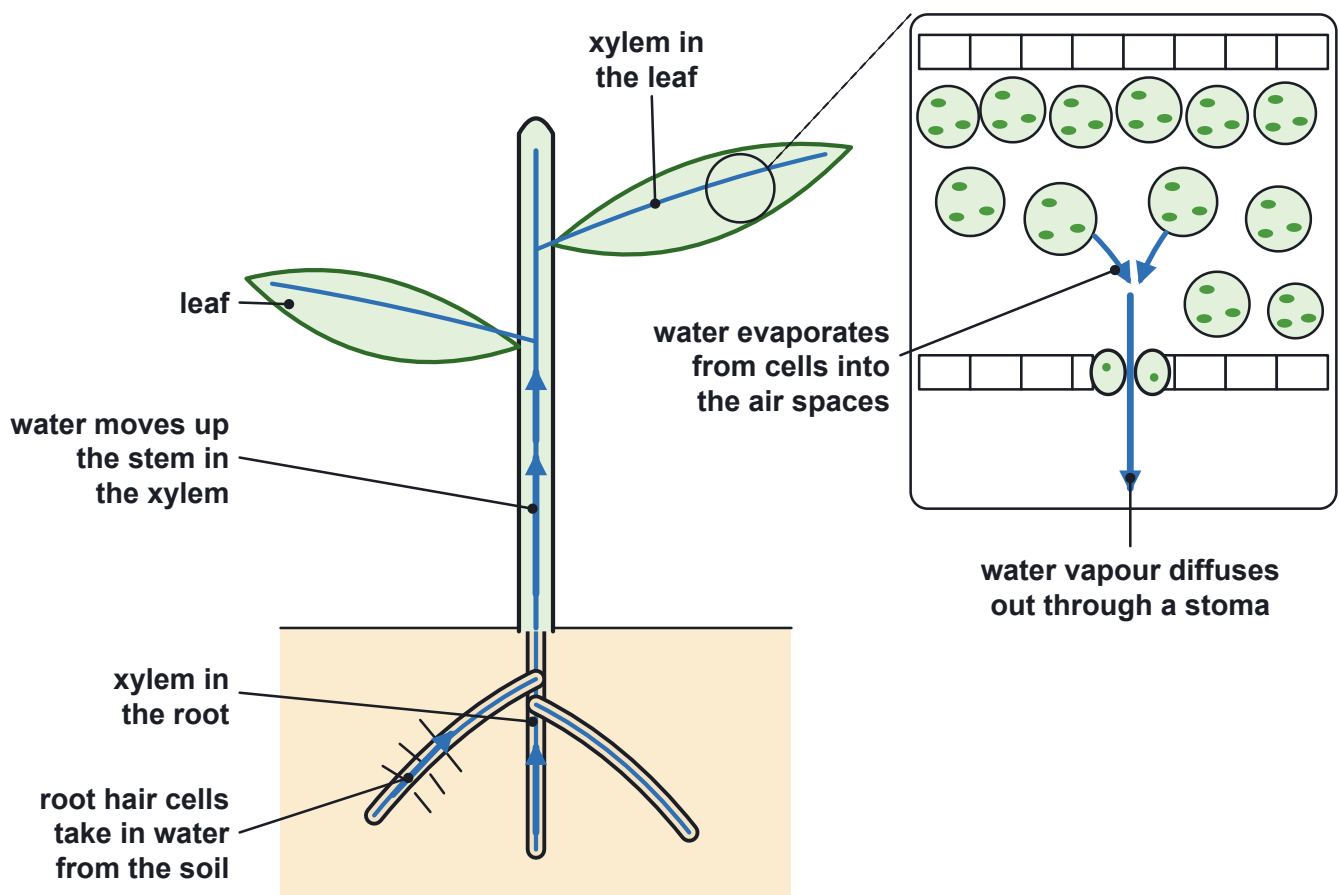
Revision notes • Transpiration as the loss of water vapour from leaves, how temperature and wind speed affect its rate, and measuring it with a potometer.

For Cambridge IGCSE Combined Science 0653. **Supplement** is Extended content, only examined on Papers 2 and 4.

Transpiration Spec B8.3

Transpiration Spec B8.3.1

Transpiration is the loss of water vapour from leaves.



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In the leaf, water evaporates from the mesophyll cells and the vapour diffuses out through the stomata.

Factors affecting the rate of transpiration Spec B8.3.2 **Supplement**

The rate of transpiration changes with the conditions around the plant. You must be able to describe the effects of **temperature** and **wind speed**.

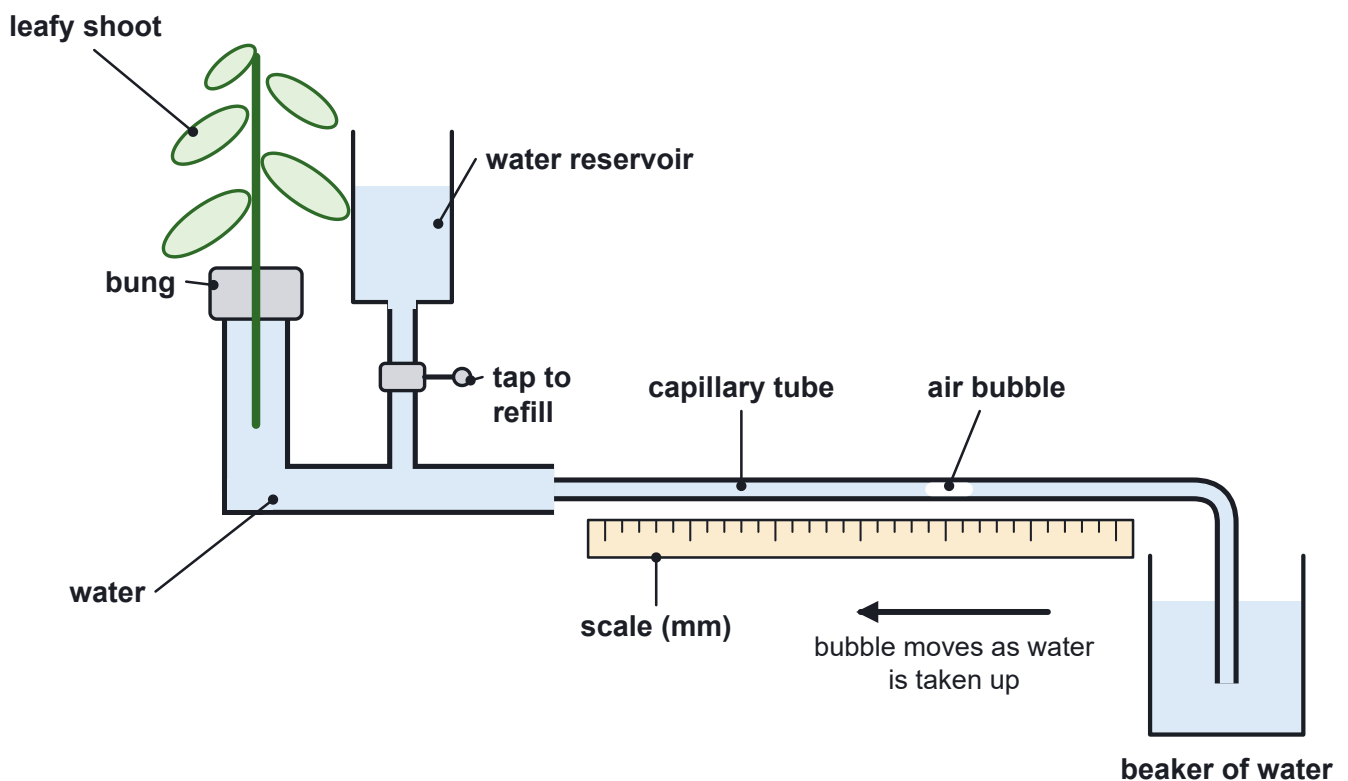
Effect of environmental factors on the rate of transpiration

Factor	Effect on rate
Temperature	higher temperature gives a faster rate
Wind speed	higher wind speed gives a faster rate

Measuring the rate: the potometer

A **potometer** measures how much water a cut shoot takes up. Most of the water taken up is lost by transpiration, so water uptake is used as an estimate of the rate of transpiration. As the shoot takes up water, an air bubble in the capillary tube moves along a scale.

1. Cut a leafy shoot under water and fit it into the potometer, keeping the apparatus full of water with no air bubbles.
2. Introduce an air bubble into the capillary tube and note its starting position.
3. Change one factor, for example place a fan at different distances to vary wind speed, or use rooms or water baths at different temperatures.
4. Measure the distance moved by the bubble in a set time.
5. Repeat and calculate a mean. Keep everything else the same.



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As the shoot takes up water, the **air bubble** moves along the scale.

$$\text{rate of water uptake} = \text{distance moved by bubble} \div \text{time}$$

Calculating a rate

In a potometer, the air bubble moved 45 mm in 15 minutes. Calculate the rate of water uptake in mm / min.

1 . rate = distance ÷ time

2 . rate = $45 \div 15$

Answer: 3 mm / min

Practical skill: Name the independent variable (for example wind speed), the dependent variable (distance moved by the bubble in a set time) and at least two controlled variables (such as the same shoot, temperature and light). Repeat the experiment for reliability.

Quick check

1 . Define transpiration.

2 . **Supplement** Name two factors that increase the rate of transpiration when they increase.

Quick check answers

Transpiration

1. The loss of water vapour from leaves.
2. Temperature and wind speed.