Water uptake with a potometer

Student activity • practical and reasoning

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The question

How does air movement affect a leafy shoot's water uptake?

Measure water uptake with a staff-prepared apparatus; use actual observations.

Equipment

- Staff-assembled potometer with leafy shoot, reservoir and capillary scale
- Timer, thermometer and guarded low-voltage fan

Staff cut stems and assemble glass tubing before class. Do not force glass into bungs or tubing. Wear eye protection around glass, support apparatus securely, keep electrical equipment and leads away from water, and wipe spills promptly.

Course coverage: Biology only: 2.58B. Environmental factors and water uptake.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Inspect the staff-assembled, water-filled apparatus without pulling glass from tubing. Check the shoot is supported and the system has no visible leaks.

2. At steady room light and temperature, allow at least five minutes to settle. Record room temperature and the capillary scale.

3. With the fan off, record bubble position at the start and after two minutes. Repeat three times, using the reservoir reset under staff direction.

4. Place the guarded low-voltage fan at a marked fixed distance and setting. Keep light and temperature as similar as possible; allow five minutes to settle before three further two-minute measurements.

5. Repeat a fan-off measurement to check drift. Note any leaks, sudden jumps or drying; do not hide invalid trials.

6. Calculate distance/time. If the internal radius is known, calculate uptake volume/time using $\pi r^2 \times$ distance/time, keeping units consistent. Compare repeats and discuss limits.

Cleanup

- Staff dismantle and store glass apparatus.
- Switch off fans, dry benches and wash hands after plant handling.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Record actual measurements. A moving bubble measures water uptake, not water loss directly. Uptake can also supply growth and replace stored water. A single shoot provides repeated readings, not independent biological replicates. Compare class shoots and document differences.

Condition / repeat	Start / mm	End / mm	Time / s
Still 1			
Still 2			
Still 3			
Fan 1			
Fan 2			
Fan 3			
Still recheck			

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. What is changed?

2. What is measured directly?

3. How is volume found from distance?

4. Why allow settling time?

5. Why repeat the fan-off condition?

6. What limits the transpiration inference?