

OCR (A) Biology A-level

3.1.3 - Transport in plants

Flashcards

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Why do plants require a transport system?



Why do plants require a transport system?

To ensure all cells receive a strong supply of the nutrients they require.

Especially important as a plant must be able to transport substances up their stem (against gravity).



Relate the structure of xylem to its function.



Relate the structure of xylem to its function.

- Long, continuous columns made of dead tissue, allowing transportation of water.
- Contain pits, allowing water to move sideways between vessels.
- Thickened with a tough substance, providing structural support.



Relate the structure of phloem to its function.



Relate the structure of phloem to its function.

- Sieve tube elements transport sugars around the plant.
- Companion cells designed for active transport of sugars into tubes.
- Plasmodesmata allow flow of substances between cytoplasm of different cells.



Describe the structure and function of the vascular system in the roots.



Describe the structure and function of the vascular system in the roots.

Consists of xylem and phloem. Xylem arranged in an X shape to provide resistance against force. Surrounded by endodermis, a water supply.



Describe the structure and function of the vascular system in the stem.



Describe the structure and function of the vascular system in the stem.

Consists of xylem and phloem. Xylem on the inside of the bundle to provide support and flexibility, phloem on the outside. Layer of meristem cells that produce new xylem and phloem tissue when required.



Describe the structure and function of the vascular system in the leaves.



Describe the structure and function of the vascular system in the leaves.

Consists of xylem and phloem, forms the midrib and veins. Involved in transport and support.



Define transpiration.



Define transpiration.

- The evaporation of water from the leaves of a plant.
- Consequence of gaseous exchange; occurs when the plant opens the stomata to exchange oxygen and CO_2 .



Name factors that affect the rate of transpiration.



Name factors that affect the rate of transpiration.

- Increased light increases transpiration.
- Increased temperature increases transpiration.
- Increased humidity decreases transpiration.
- Increased air movement increases transpiration.
- Waxy cuticle prevents transpiration.



How can we measure transpiration rate?



How can we measure transpiration rate?

Potometer. Plant cutting is placed in a water-filled tube that contains an air bubble. Rate of transpiration is calculated by measuring the movement of the air bubble over time.



Define water potential as a mechanism of movement in plants.



Define water potential as a mechanism of movement in plants.

- Water potential = the tendency of water to move by osmosis, from high water potential to low. Pure distilled water has the highest water potential of 0.
- This is the basis by which water moves to the areas it is needed within plants.



Explain what is meant by the apoplastic pathway.



Explain what is meant by the apoplastic pathway.

A method of osmosis through the root hair cells, where water moves through the cell walls and intercellular spaces. This pathway can only be used until water reaches the Casparian strip.



Explain what is meant by the symplastic pathway.



Explain what is meant by the symplastic pathway.

A method of osmosis through the root hair cells, where water moves through the cytoplasm via plasmodesmata. To begin this pathway, water must be actively transported into cells.



Explain the cohesion-tension theory.



Explain the cohesion-tension theory.

Water molecules form hydrogen bonds with each other, causing them to 'stick' together (cohesion). The surface tension of the water also creates this sticking effect. Therefore as water is lost through transpiration, more can be drawn up the stem from the roots.



Give adaptations of xerophytes that allow them to live in dry conditions.



Give adaptations of xerophytes that allow them to live in dry conditions.

- Small/rolled leaves
- Densely packed mesophyll
- Thick waxy cuticle
- Stomata often closed
- Hairs to trap moist air



Give adaptations of hydrophytes that allow them to live in wet conditions.



Give adaptations of hydrophytes that allow them to live in wet conditions.

- Thin or absent waxy cuticle
- Stomata often open
- Wide, flat leaves
- Air spaces for buoyancy



Summarise the mechanism of
translocation.



Summarise the mechanism of translocation.

- Sucrose produced in leaves loaded into sieve tubes via active transport (requiring energy).
- Lowers water potential, causing water to move in from xylem.
- Assimilates move along the sieve tube towards areas of lower hydrostatic pressure (sink). Sucrose diffuses into surrounding cells where it is needed.

