OCR (B) Biology A-level

2.2.4 - Transport systems in plants

Flashcards

Why do plants require a transport system?

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To ensure all cells receive a good supply of the nutrients they require. Especially important as a plant must be able to transport substances up the stem, against gravity.

Relate the structure of the xylem to its function.

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- Long, continuous columns made of dead tissue, allowing the transportation of water.
- Contain bordered pits, allowing the sideways movement of water between vessels.
- Walls impregnated with lignin, providing structural support.

Relate the structure of the phloem to its function.

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- Sieve tube elements transport sugars around the plant.
- Companion cells designed for active transport of sugars into tubes.
- Plasmodesmata allow communication and the exchange of substances between sieve tubes and companion cells.

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

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

Xylem arranged in an X shape to provide resistance against force. Phloem found as patches between the arms. Surrounded by endodermis, aiding water passage.

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

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

Vascular tissue found centrally as a circle of xylem (inner) and phloem (outer).

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

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Vascular bundles organised around a central pith. Xylem on the inside of the bundle to provide support and flexibility, phloem on the outside. Cambium is found between the two.

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

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Vascular bundles are found scattered across the stem.

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

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

Xylem and phloem form the central midrib and veins. Involved in transport and support.

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

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

Consists of xylem and phloem which form the veins. No central midrib.

Explain what is meant by the apoplastic pathway.

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A pathway through the root hair cells. Water moves through extracellular spaces between molecules in the cell wall. This pathway stops at the Casparian strip.

Explain what is meant by the symplastic pathway.

Explain what is meant by the symplastic pathway.

A pathway through the root hair cells. Water enters the cytoplasm and moves between adjacent cells via plasmodesmata.

Explain what is meant by the vacuolar pathway.

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A pathway through the root hair cells. Water enters the cytoplasm and moves between cells through vacuoles.

Explain the cohesion-tension theory.

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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. As water is lost through transpiration, more water is drawn up the stem from the roots.

How is water transported around a plant?

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- Osmosis = water moves from areas of high water potential to low water potential.
- Transpiration stream = as water is lost through transpiration, more is drawn up the stem.

Define transpiration.

Define transpiration.

- The loss of water vapour from the parts of a plant exposed to the air due to evaporation and diffusion
- Consequence of gaseous exchange; occurs when the plant opens the stomata to exchange O_2 and CO_2

Name factors that affect the rate of transpiration.

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

Summarise the mechanism of translocation.

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- 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.