What is the Plant Vascular System?

Worksheet

The vascular system consists of xylem and phloem. Xylem transports water and minerals from roots upward via transpiration pull; phloem transports sugars from leaves in both directions via active transport. Both are essential for plant survival.

Questions

1. Which is NOT a function of xylem?

A) Transport water upward
B) Transport minerals
C) Transport sugars to roots
D) Provide stem structure (wood)

2. Phloem transport requires

A) Only gravity
B) Only transpiration pull
C) ATP and active transport
D) Osmotic pressure only

3. If you girdle a tree (remove all phloem but leave xylem), what happens?

A) Tree dies immediately
B) Roots starve of sugars; leaves live
C) Top dies; roots live
D) No effect

4. Where is phloem located in a stem?

A) Center (wood)
B) Just inside bark
C) In the pith
D) Between xylem and bark

5. A plant is 50 cm tall. If water rises at 5 cm/hour via xylem, how long does water take to reach the top of the plant?

6. A leaf produces 20 g of sugar per day. If phloem distributes sugar to 4 growing regions equally, how much sugar goes to each region?

7. In winter, a tree's phloem carries stored sugars from the root (40 g) upward. By spring, the root has used 15 g. How much remains?

8. Define: What does xylem transport?

9. Define: What does phloem transport?

10. Define: Why is xylem made of dead cells?

Answer Key

1. C) Transport sugars to roots - Xylem transports water and minerals, not sugars. Phloem transports sugars.

2. C) ATP and active transport - Phloem uses active transport (ATP-driven) and osmotic pressure to move sugars in both directions.

3. B) Roots starve of sugars; leaves live - Xylem still delivers water to leaves (photosynthesis continues); phloem cannot deliver sugars to roots, so roots eventually die.

4. D) Between xylem and bark - Phloem surrounds the xylem and sits just inside the bark, while xylem (wood) is central.

5. Plant height = 50 cm Water rise rate = 5 cm/hour Time = height rate = 50 5 = 10 hours

6. Total sugar = 20 g Growing regions = 4 Sugar per region = 20 4 = 5 g

7. Initial sugar = 40 g Used = 15 g Remaining = 40 15 = 25 g

8. Water and dissolved minerals from roots to leaves, against gravity, via transpiration pull.

9. Sugars (products of photosynthesis) from leaves to all parts of the plant via active transport.

10. Dead cells form continuous tubes with no cell walls blocking transport; living organelles would obstruct flow.