What is a Plant Root System?

Worksheet

A root system is the aggregate of all roots on a plant. Taproots are one thick central root; fibrous roots are many similar-sized roots spreading outward. Both absorb water and minerals, anchor the plant, and store reserves.

Questions

1. Which plant type typically has a fibrous root system?

A) Carrots
B) Dandelions
C) Grasses and corn
D) Oak trees

2. What is the primary function of root hairs?

A) To anchor the plant
B) To store starch
C) To increase surface area for absorption
D) To photosynthesize

3. How do roots sense gravity?

A) Phototropism
B) Geotropism/gravitropism
C) Chemotropism
D) Thigmotropism

4. What is the zone of maturation in a root?

A) Where root hairs emerge
B) Where cells divide (meristematic)
C) Where the root cap is
D) Where the vascular cylinder ends

5. A taproot grows 60 cm deep. If it has 12 lateral branches, how many main root pathways does this system have?

6. A grass plant's fibrous root network spreads 40 cm wide and 25 cm deep. What is the root spread ratio (width:depth)?

7. A root hair cell absorbs 0.5 mL of water in 1 hour. If it absorbs at this rate for 8 hours, how much water has it absorbed?

8. Define: What is the main difference between taproot and fibrous roots?

9. Define: What are root hairs?

10. Define: Why do roots grow downward?

Answer Key

1. C) Grasses and corn - Monocots (grasses, corn, wheat) have fibrous roots; dicots (carrots, oaks) have taproots.

2. C) To increase surface area for absorption - Root hairs are elongations that maximize surface contact with soil water and nutrients.

3. B) Geotropism/gravitropism - Roots exhibit positive gravitropism, growing downward toward the direction of gravity.

4. A) Where root hairs emerge - The zone of maturation is where differentiated root hair cells emerge and absorb water.

5. Taproot = 1 main pathway Lateral branches = 12 Total pathways = 1 + 12 = 13

6. Width = 40 cm Depth = 25 cm Ratio = 40:25 = 8:5 (simplify by 5)

7. Absorption rate = 0.5 mL/hour Time = 8 hours Total = 0.5 8 = 4 mL

8. Taproots have one large central root; fibrous roots have many similar-sized roots spreading outward.

9. Tiny extensions of root epidermal cells that greatly increase the surface area for water and mineral absorption.

10. Roots exhibit positive gravitropism - they grow in the direction of gravity to find water in the soil.