

Introduction to Botany. Lecture 9

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Outline

- 1 Questions and answers
- 2 Roots and root systems
 - Root morphology
 - Anatomy and development of roots

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- 2 Roots and root systems
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Previous final question: the answer

Give an example of secondary complex tissue.

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Give an example of secondary complex tissue.

- Periderm
- Secondary phloem
- Secondary xylem

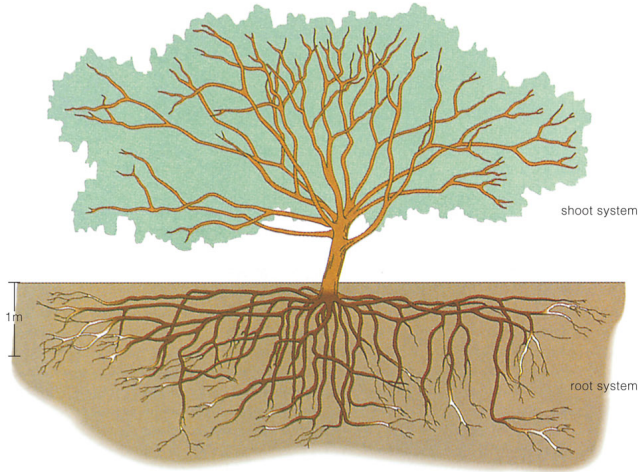


Roots and root systems

Root morphology



Root system and shoot system



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Definition and functions

- Axial vegetative organ with a function of soil nutrition
- Other functions:
 - ① Anchor
 - ② Synthesis
 - ③ Storage
 - ④ Communication
- Features:
 - ① No leaves
 - ② Geotropic growth
 - ③ Locates in soil or water



Types of roots

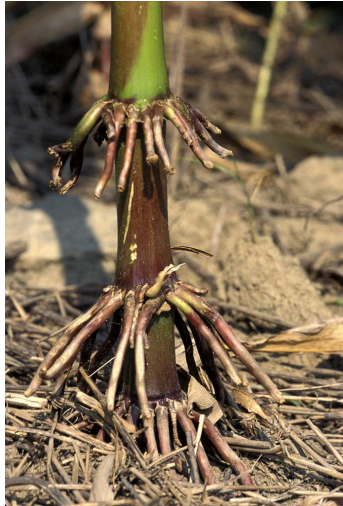
- Primary root: originates from root of seedling
- Secondary (lateral) roots: originate from primary roots
- Adventitious roots: originate from stems



Primary root



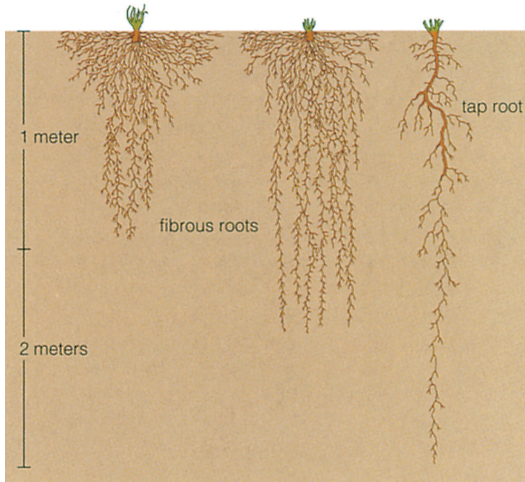
Adventitious roots



Root systems

- Tap root system: with well developed primary root (most seed plants)
- Fibrous root system: without clearly visible primary root (monocots, ferns)

Fibrous and tap root systems



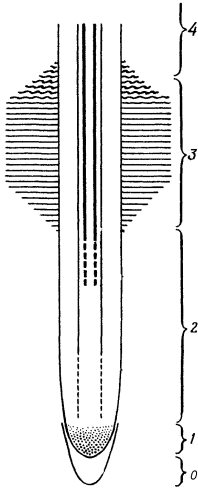
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Roots and root systems

Anatomy and development of roots

Root zones

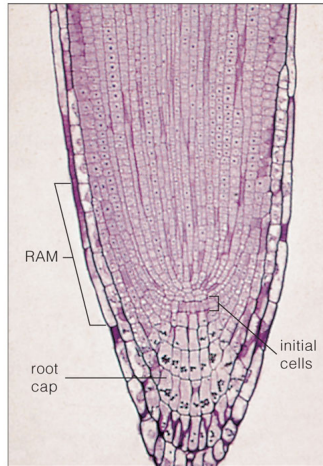


- Root cap
- Root meristem
- Elongation zone
- Absorption zone
- Maturation zone

Structure of root tip

- Initial cells (quiescent center)
- RAM
- Root tip growing both forward (root cap) and backward (other root tissues), initial cells determine the direction of growth
- If root tip touch barrier, it starts to make rotating movements

Root tip



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Periphery of root

- Rhizoderm (root epidermis): fast-degrading cells
- Cortex, which includes also:
 - Endoderm: 1-cell layer with specialized cell walls, located on the border with vascular cylinder
 - And (sometimes) exoderm: similar to endoderm but located just under rhizoderm
- In some plants (i.e., orchids), cortex modified into velamen



Final question (1 point)

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What are adventitious roots?

Summary

- **Root** is an axial vegetative organ with a function of soil nutrition
- **Rhizoderm** and **absorption zone** are the most physiologically important parts of root



For Further Reading



J. E. Bidlack, Sh. H. Jansky.
Stern's introductory plant biology. 12th edition.
McGraw-Hill, 2011.
Chapter 5.



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapter 7.

