

Root Systems
Sept. 6, 2007 PMB 102/IB101

Evolution

- Earliest evidence of roots with fossil Lycopod plants, about 400 million years ago
- Root transformed (originated) from a shoot dichotomy

Consider roots from a structure/function approach

-Symplastic versus apoplastic systems

-functions

- anchoring plant
- storing foods
- uptake of water and nutrients

Structural Principles for maximizing absorption

- maximizing effective absorptive interface for water
 - locating absorbing elements near relevant interface
 - thin permeable cell wall
 - rhizodermis
 - modifications = root hairs
 - mutalistic associations
 - mychorrhizae
 - ectomycorrhizae
 - endomycorrhizae
 - adaptations for increasing water uptake
 - Velamen
 - found in many epiphytes, such as orchids
 - Casparian Strip
 - near universal feature of most roots
- Other root adaptations/modifications
- Contractile roots
 - Xeric adaptations

-Lateral or Branch Roots

- Originate in pericycle
 - opposite protoxylem pole
 - involves several cells
 - not randomly arranged
- Periodicity in production
- Emergence of lateral through cortex

-Interactions with other organisms

- Haustoria
 - found in many parasitic plants (e.g., mistletoe)
- Nodules