

Arbuscular mycorrhizae

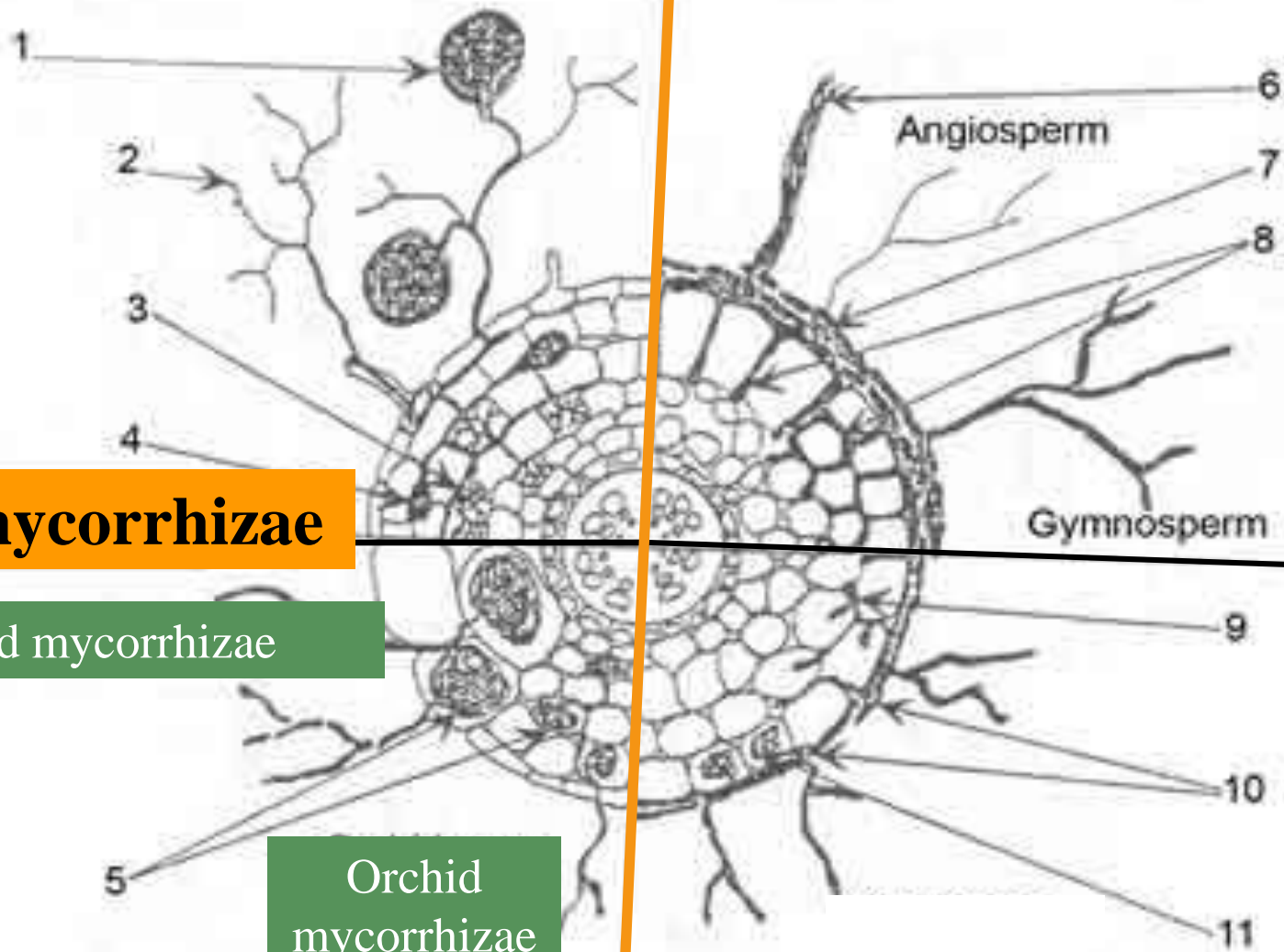
Ectomycorrhizae

Endomycorrhizae

Ericoid mycorrhizae

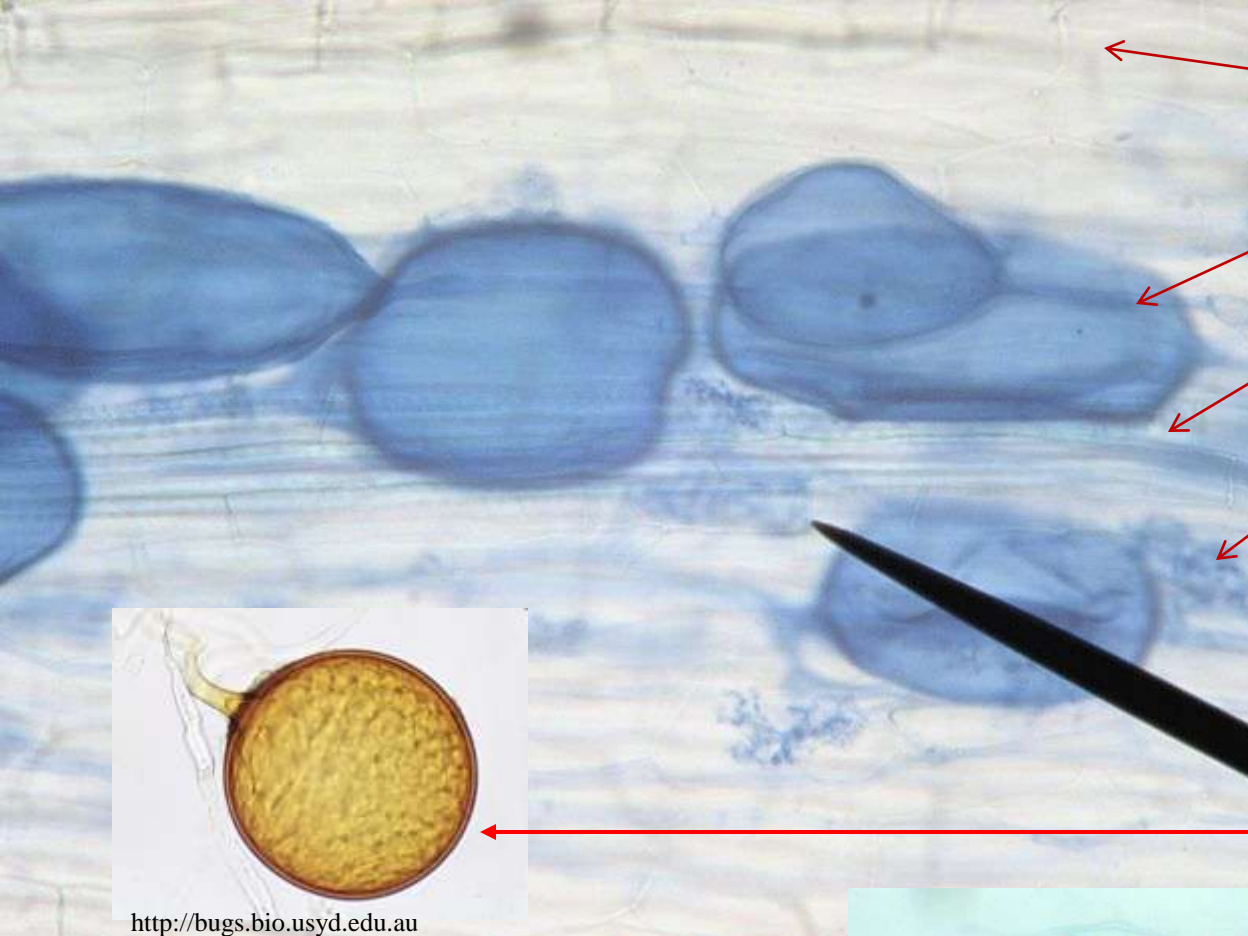
Orchid mycorrhizae

Ectendomycorrhizae



Arbuscular Mycorrhizae (AM)

- Zygomycota (*Acaulospora*, *Endogone*, *Gigaspora*, *Glomus*)
- Hyphae lack cross-walls (asepate)
- Found in over 80% of all plant families
- Arbuscules (branching structures) in root cortical cells
- Many species also form vesicles or spores



Cortical cell

Vesicle

Xylem

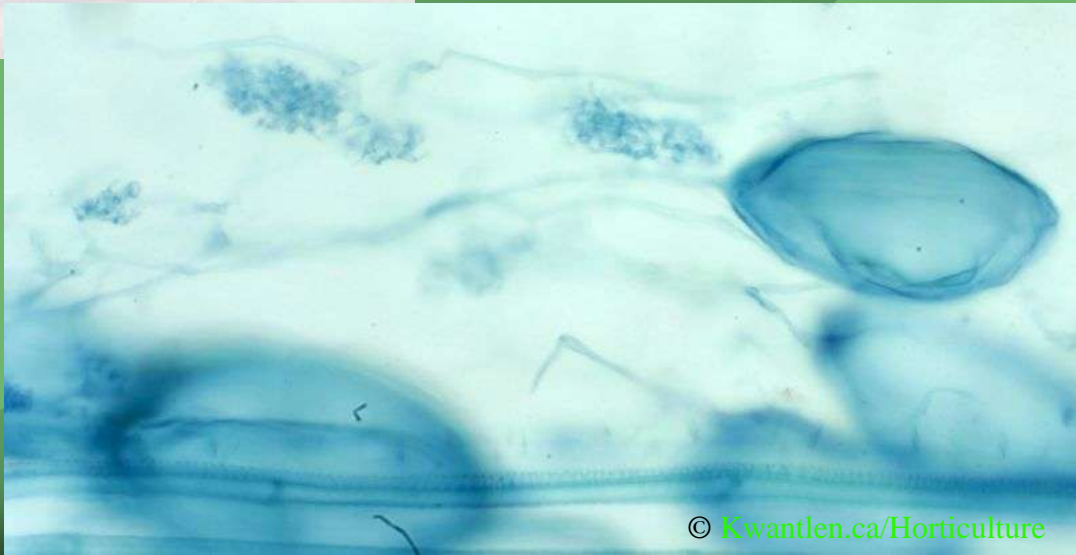
Arbuscule

Spore

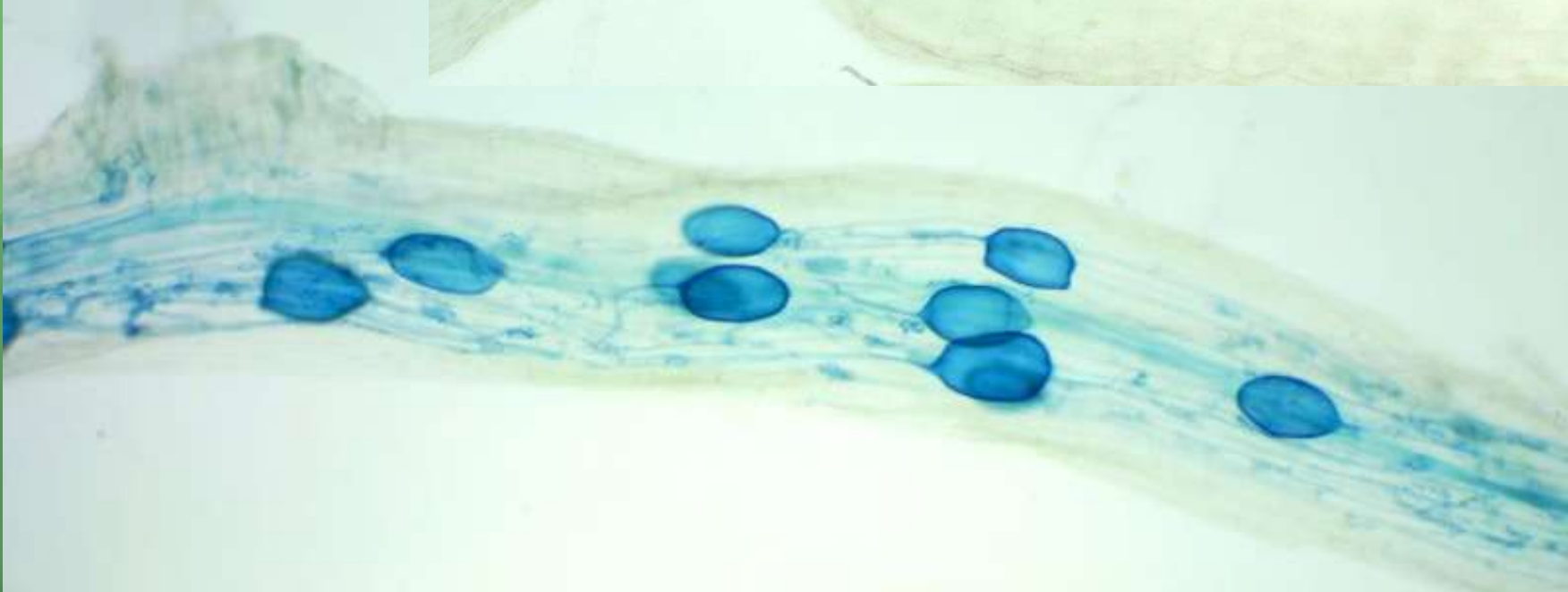
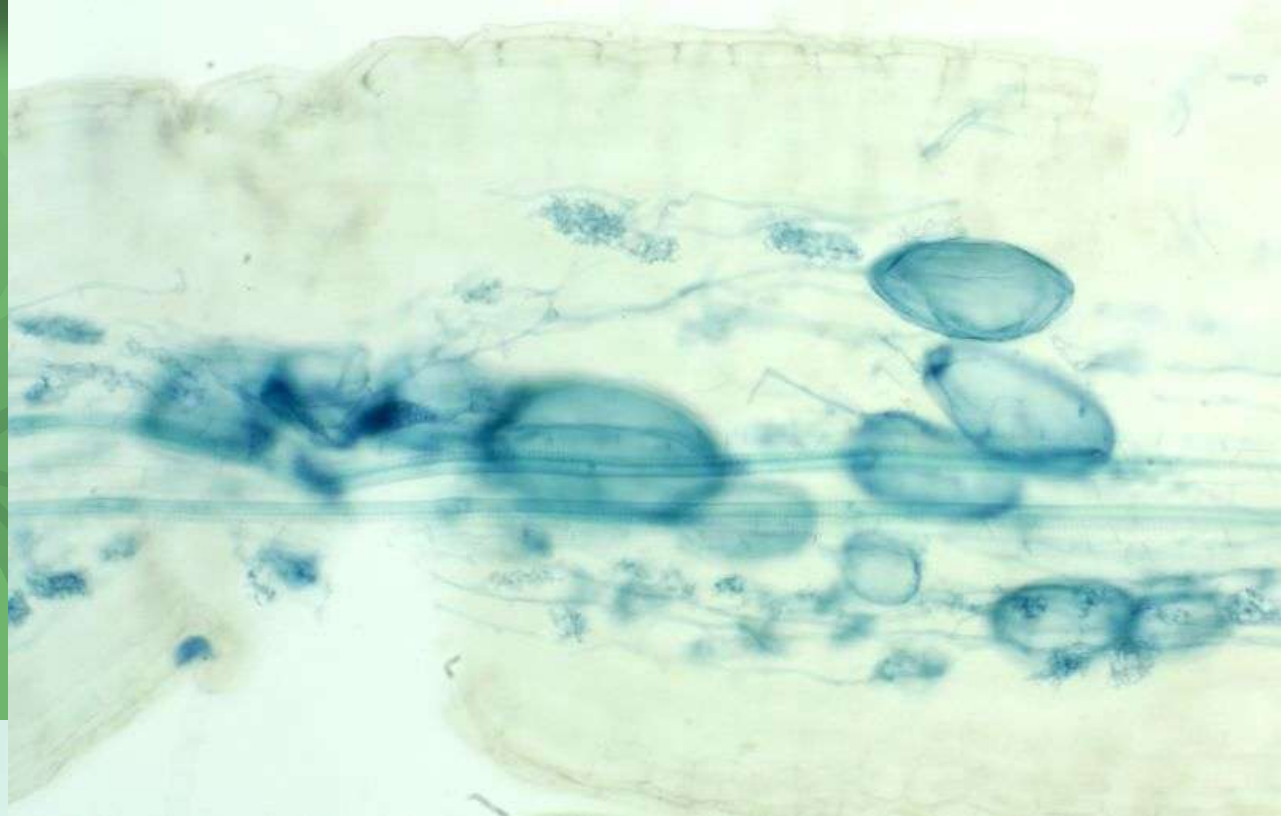


<http://bugs.bio.usyd.edu.au>

AM fungi enhance the uptake of P, Zn, and Cu to the plant



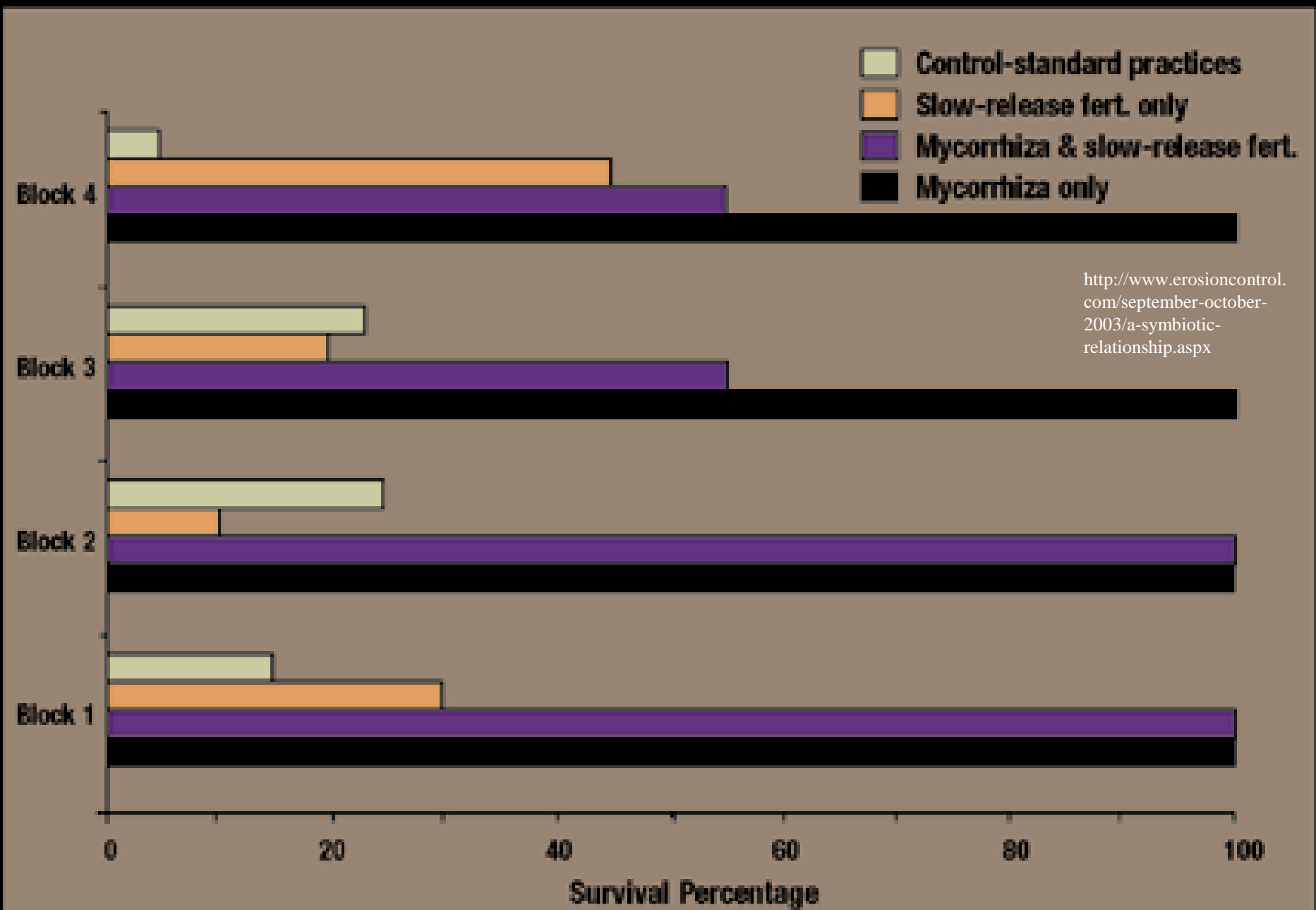
In return the
plant supplies
sugars to the
fungus
(mutualistic
symbiosis)



AM and Disease Resistance

- Indirectly, the uptake of many other nutrients may be increased in part because of improved plant vigour
- For many hardwood trees strong growth responses to AM fungi occur when growing in soil and indicate they depend on AM for survival in nature (Marx, 1997)
- Decreased disease susceptibility (Morandi, 1996; Newsham *et al.*, 1995), drought tolerance (Stahl *et al.*, 1998) or reduced transplanting shock (Puthru *et al.*, 1998) due to the presence of AM fungi is also widely reported (Linderman, 1994)

Figure 4. Outplanting Survival of *Agrostis Pallens* Following Different Combinations of Mycorrhiza and Slow-Release Fertilizer Treatments at J. Herbert Stone Nursery



“... the progressive binding of phenolic compounds in VAM roots is directly involved in the control of VAM endophytic establishment and development, as it gradually reduces the plasticity and elasticity of the symbiotic matrix.

Phenolic compounds bound to cell walls could also be indirectly responsible for the resistance of VAM roots to pathogenic fungi, since they result in increased resistance by the cell wall to the action of digestive enzymes.”

Mycorrhiza News 19(4) • January 2008

Ericoid Mycorrhizae

- Locally found in the Ericaceae (e.g. *Arbutus*, *Calluna*, *Erica*, *Kalmia*, *Leucothoe*, *Pieris*, *Rhododendron*, and *Vaccinium*)
- The few identified fungal species belong mostly to the Ascomycota (e.g. *Oidiodendron* and *Rhizoscyphus*)
- Nitrogen accessed at low pH by the plant primarily via the mycorrhizal fungi that can digest the organic matter



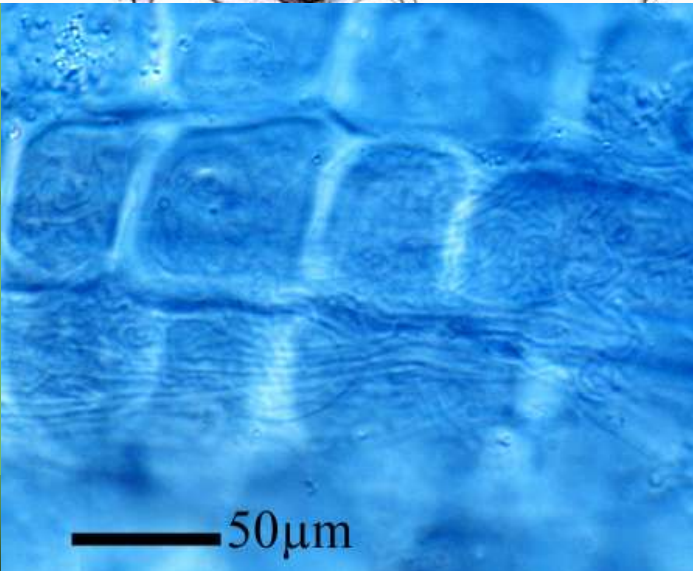
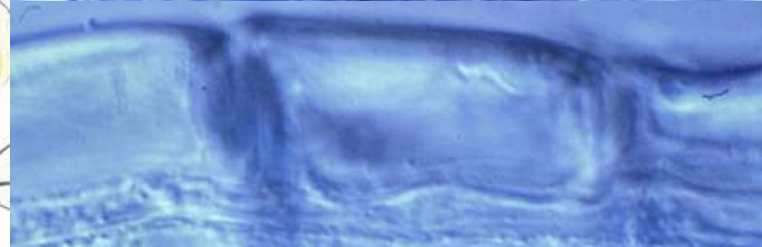
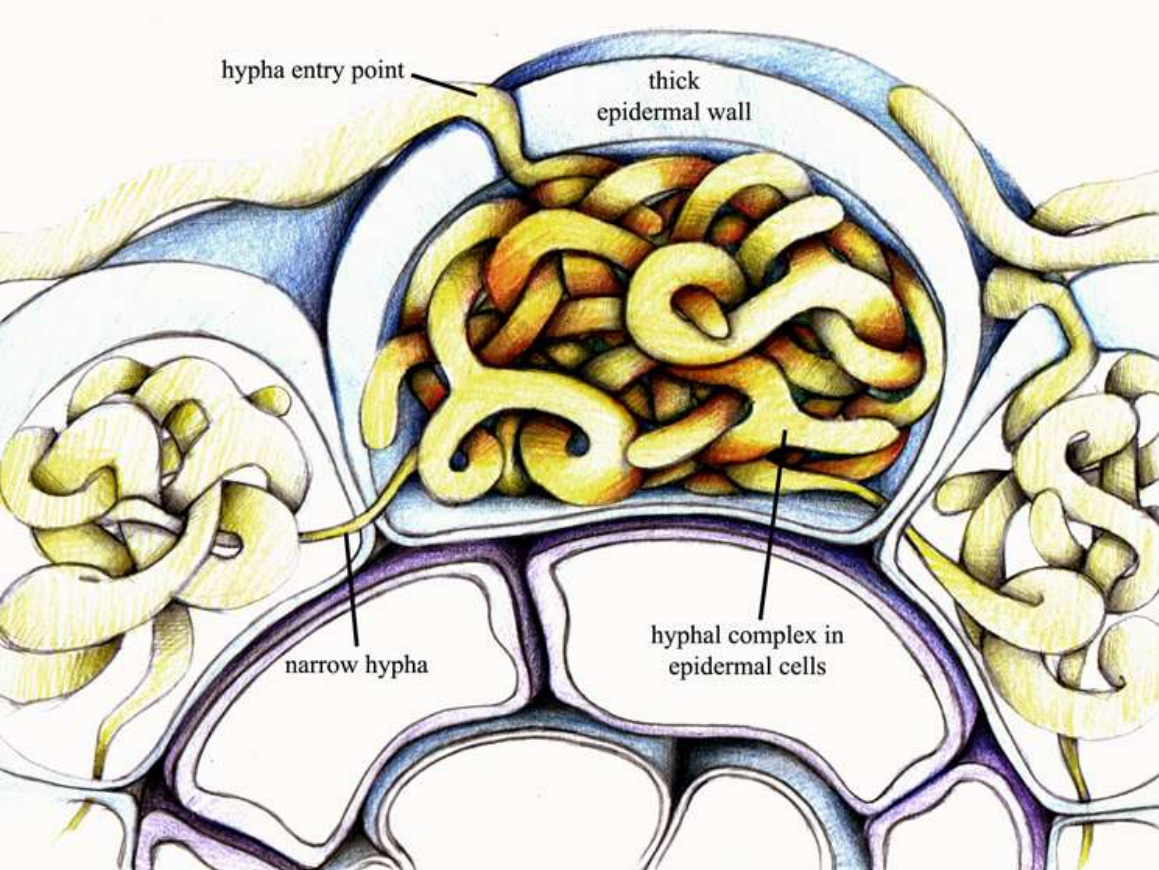


Photo Credits (images with no URL shown)

Peterson, R.L., *et. al.* 2006. Mycorrhizas: Anatomy and Cell Biology Images. NRC Research Press.

Roth, A.L. 1990. Mycorrhizae of Outplanted Conifers. M.Sc. Thesis. University of British Columbia. 298 p

Roth, A.L. Kwantlen Plant Database
(www.Kwantlen.ca/Hort)

Selected References

Azcón-Aguilar, C. and J. M. Barea, 1996. Arbuscular mycorrhizas and biological control of soil-borne plant pathogens – an overview of the mechanisms involved. *Mycorrhiza* V. 6: 457-464

Morandi D. 1996. Occurrence of phytoalexins and phenolic compounds in endomycorrhizal interactions, and their potential role in biological control. *Plant and Soil* 185, 241–251.

Smith, S.E. and D.J. Read. 1997. *Mycorrhizal Symbiosis* (2nd Ed.). 605 pp. Academic Press, San Diego and London

Whipps, J.M. 2000. Microbial Interactions in the Rhizosphere. *J. Exp. Botany*. V. 52: 487-511